STANDARDS DEVELOPMENT BRANCH OMOE
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REVISION OF REGULATION 308

PART I

Identification of Standards, Interim Standards, and Carcinogens for Review, Update, and Assessment

prepared by

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1. NATURE AND SCOPE OF THE IDENTIFICATION PROCESS

In an effort to update and revitalize the current practices used in Ontario for evaluating, regulating, and controlling potential risks that may result from exposure to airborne contaminants of anthropogenic and natural origin, the Air Resources Branch (ARB) of the Ontario Ministry of the Environment (OMOE) has undertaken, among other tasks, a detailed review of the standards and interim standards for air contaminants actually in use in Ontario. This review, which encompasses approximately 300 chemicals, is aimed primarily at up-dating and, if necessary, developing scientifically defensible permissible levels for primary air contaminants and their precursors. These levels, if and when enforced and/or respected, should not pose unacceptable risks to critical receptors under their most likely conditions of exposure while providing socially and economically acceptable guidelines for restricting the emissions responsible for such occurrences.

Due to the high number of chemicals targeted by this review, to the substantial amount of scientific information that need to be processed and critically evaluated, and to the limited amount of time and resources available it is essential, as a first step, to develop a framework that will efficiently address each step of the review process. These steps are summarized as follows:

1) Evaluate the relevance of the air standards and interim standards currently used by the OMOE

2) Identify those air standards/interim standards that need to be updated or for which new rationales must be developed

3) Identify those air standards/interim standards requiring immediate attention (high priority), and those whose review may be delayed (medium and low priority).

Following completion of these steps it will be necessary, for those air standards/interim standards requiring changes from the current values as well as for new chemicals to be included in this review process (e.g., new air pollutants identified in the Windsor study) to:

4) Evaluate the relevance of the regulatory information available from other agencies for the adoption and implementation of air standards/interim standards

5) evaluate the relevance of the scientific information available from primary sources for the development and implementation of air standards/interim standards

Step 5 assumes, therefore, that in the absence of relevant criteria and/or guidelines for those chemicals requiring changes (as identified in steps 1, 2, and 3), or in the event that such numbers may not be scientifically defensible and applicable in the current regulation, new rationales that will support the development and implementation of air standards/interim standards will be developed.

The intent of the current report is to introduce and apply the framework used in the identification process (steps 1 and 2), and present the results obtained (steps 3, 4, and 5 pertaining to the procedures used to prioritize, evaluate, adopt, or develop interim air standards will be treated elsewhere).

2. DESCRIPTION OF THE IDENTIFICATION PROCESS

2.1 Observations on the Current Methodology

The air standards and interim standards adopted by the Air Resources Branch of the Ontario Ministry of the Environment, and used as a starting point in the current review, were those recently updated and summarized in the document "Summary of Point of Impingement Standards, Ambient Air Quality Criteria (AAQCs), and Approvals Screening Levels (ASLs)" (ARB, Ontario Ministry of the Environment, August 1992) (see Appendix A). This document includes all chemicals contained in Ontario Regulation 308.

In the above stated document, air contaminants are listed in alphabetical order with their CAS No., half-hour point of impingement values, point of impingement limiting effects, status (either standard or interim standard), Ambient Air Quality Criteria (AAQC), and AAQC limiting effect. Limiting effects for both categories cited (half-hour point of impingement and AAQC) are related either to odour, health, corrosion, soiling, effects on animals, ozone depletion, particulate, or effects on vegetation depending on the most sensitive and relevant response.

Among the standards and interim standards displaying health-based limiting effects, a few were identified as carcinogens (CARC). These comprise: benzene; dichlorobenzidene, 3,3-; nitrosodiethyl- and nitrosodimethylamine, n-. On the other hand, benzo(a)pyrene, chlorinated dibenzo-p-dioxins, coal tar pitch volatiles, polychlorinated biphenyls, and vinyl chloride were not classified in the CARC category although they are considered as "probable" or "recognized" human carcinogens by the International Agency for Research on Cancer (IARC, 1987) and the U.S. EPA (U.S. EPA, 1992a, 1992b). Several other standards and interim standards categorized as "probable" and "recognized" human carcinogens were not identified as so in the ARB listing thus preventing their eventual classification and assessment as required for potentially high risk contaminants.

For the majority of standards and interim standards, 24 hour-based AAQC values (in ug/m^3) are reported. A few also display annual average and short-term (1 hour, 10 minutes) values. In those cases where different 24 hour and annual average values are reported for a same chemical it is not clear whether the 24 hour value, as compared to the annual value, was adopted to prevent systemic effects following long-term exposure or short-term systemic and/or local effects. Furthermore, it is not indicated whether 24 hour and annual average values were computed to allow for exceedances (peaks of emission) and the frequency of such occurrences. In some instances, it is suggested that the annual value may be converted to a 24 hour average value by the use of a scaling factor (e.g., x 5). However, the biological significance of this procedure and the effects it is aimed at preventing are not specified. Clearly, some confusion and lack of consensus actually exists on what should be considered as the most appropriate averaging time to address different toxicological end-points.

The vast majority of 24 hour AAQCs were derived from Occupational Exposure Limits (OEL) which generally attempt to prevent short- to medium-term effects in workers under specific conditions of exposure. In some instances these values, although corrected with uncertainty factors, may not be appropriate for assessing the relevance of health effects on human populations exposed to substantially lower concentrations of environmental contaminants. In fact, there may be considerable variations in the toxicological end-points (and the resulting health effects), the nature of the target organ(s), ADME parameters (**A**bsorption, **D**istribution, **M**etabolism, **E**xcretion), and the mechanisms of action of a chemical depending on the magnitude, frequency, route, and duration of exposure. Furthermore, under certain circumstances, these values may not be appropriate to prevent adverse effects in sensitive individuals such as children, pregnant women, elderly, and asthmatics.

A major confounding factor of the current regulation is related to the use of the half hour point of

impingement (POI) limit to control emissions from point sources. The half hour POI limit is estimated by converting from 24 hour AAQC values with appropriate factors derived from mathematical models which take into account the probabilities of occurrence of meteorological conditions at a certain location. Its main intended purpose is to be used as a design standard. In fact, if point source emissions are contained in such a way that the modelled POI limit is not exceeded, then it is likely that the corresponding 24 hour AAQC would not be exceeded. However, as the estimated half hour POI limit is not directly based on possible adverse or undesirable effects that might be experienced by critical receptors, it should not be viewed as an exposure limit comparable to those generally developed by occupational and environmental regulatory agencies. Therefore, its use for estimating effects may not be appropriate depending on the nature of the limiting effects. It is definitively not appropriate for the evaluation of health effects under its current form.

Other problems identified in the current regulation but which are outside the immediate scope of this review are: absence of consideration for multiple exposures (i.e., mixtures); absence of consideration of multipathway exposure from air contaminants; absence of consideration for simultaneous impact of the emissions on air, water, soil, and food chain; and absence of consideration for intermittent exposure scenarios.

In summary, based on the information summarized above it appears that two of the most important aspects of the current ARB/OMOE methodology that must be clarified for the present Identification Process are:

1) the nature of carcinogenic compounds contained in the ARB/OMOE listing (since their assessment differ from other contaminants)

2) the most appropriate averaging time used by ARB/OMOE to address short and long-term effects that would be compatible for comparison purpose with data from other jurisdictions.

2.2 Primary Classification of Air Contaminants

For the purpose of the current review, chemicals included in the ARB/OMOE listing were grouped primarily as standards and interim standards according to the scheme illustrated in Figure 2.1. These groups were further divided into carcinogens; contaminants based on health effects; and contaminants based on effects other than health.

2.2.1 Carcinogens

Air contaminants (standards and interim standards) included in the Carcinogens group were defined as those chemicals and physical agents for which there is substantial scientific evidence indicating that they are or may be carcinogenic to humans. More specifically, air contaminants included in Group 1 and 2A of the classification developed by the International Agency for Research on Cancer (IARC, 1987), and in Group A, B1, and B2 of the classification developed by the U.S. EPA (U.S. EPA, 1992a, 1992b) were included in the Carcinogens category. The corresponding definitions are as follows:

IARC classification:

1: Human carcinogen: sufficient evidence of carcinogenicity in humans

2A: Probable human carcinogen: limited evidence of carcinogenicity in humans with sufficient evidence in animals

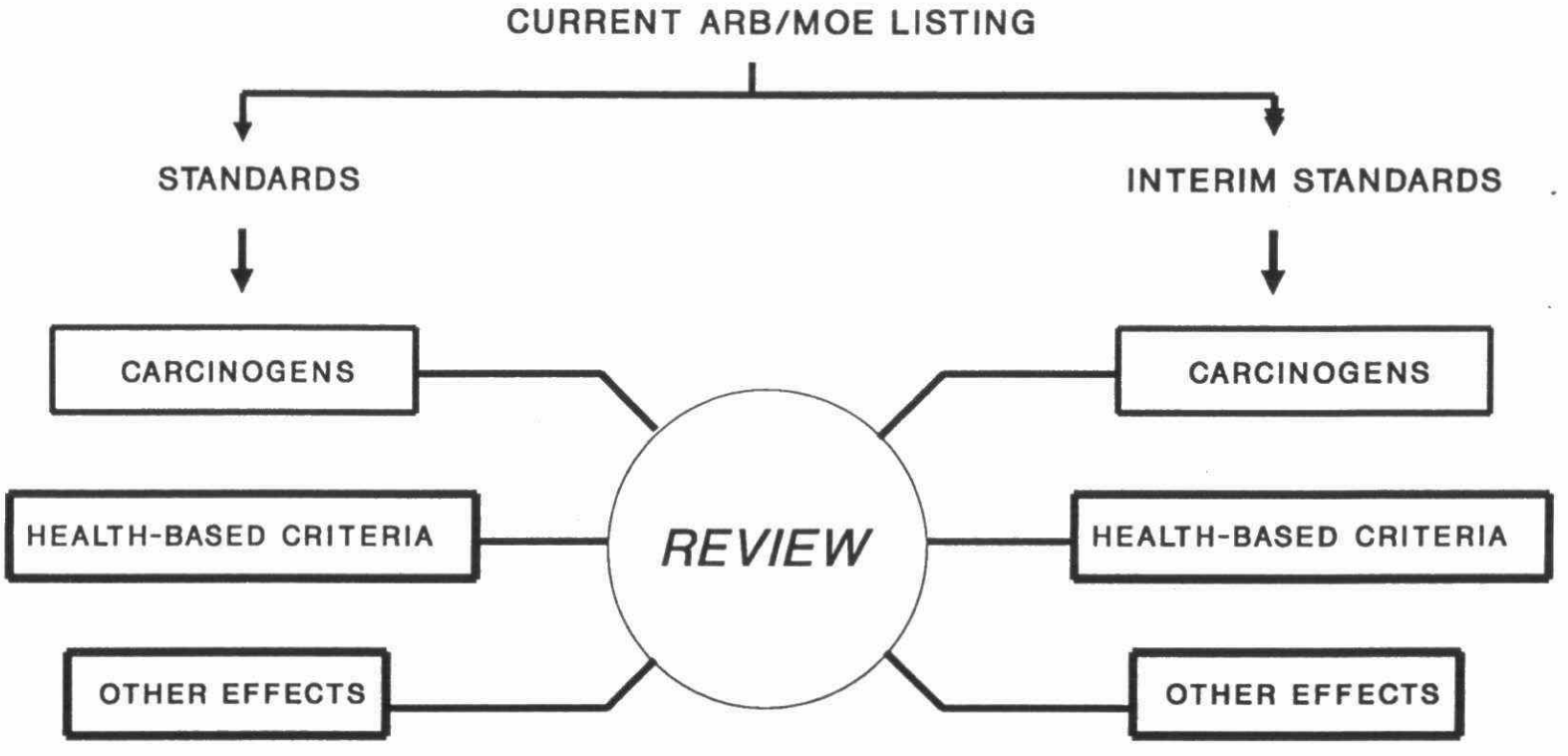


Figure 2.1 Scheme for Standards/Interim Standards Review

U.S. EPA classification:

A: Human carcinogen: sufficient evidence of carcinogenicity in humans

B1: Probable human carcinogen: limited evidence of carcinogenicity in humans with sufficient evidence in animals

B2: Probable human carcinogen: inadequate evidence of carcinogenicity in humans with sufficient evidence in animals

Chemicals included in these categories are generally assessed with quantitative risk assessment (QRA) techniques. Occasionally, chemicals included in the U.S. EPA Group C or IARC Group 2B (possible human carcinogens) may also be evaluated with QRA techniques. In this case, suitability for QRA must be determined on a case-by-case basis as suggested by the weight of the available evidence (e.g., when results of short-term tests are strongly indicative of genotoxic and/or mutagenic potential in the absence of in vivo data; when there is significant resemblance to recognized or probable human carcinogens based on structure-activity relationships; when information suggests metabolism pathways leading to the formation of activated species susceptible of interaction with critical molecular sites; a combination of the aforementioned and other factors).

The most accepted concept actually available to quantitate carcinogenic risks resulting from long-term exposure to airborne contaminants is the measurement of the air concentration that will result in a preset total maximum 70-year lifetime excess cancer risk (CAPCOA, 1987). Air concentration values may be calculated for any of these preset levels of risk by using the "unit risk factor". The unit risk factor is defined as the estimated probability of a person contracting cancer as a result of constant exposure to a contaminant at an ambient air concentration of 1 ug/m^3 over a 70 year lifetime. Mathematically, it represents the upper 95% confidence limit of the slope of the extrapolated dose-response relationship derived from epidemiological or animal bioassays with the incorporation, in the later case, of appropriate correction factors for species conversion.

Use of the unit risk factor allows the calculation of an ambient air concentration that will result in a specific lifetime risk of developing cancer when exposure occurs continuously for a period of 70 years. This concentration is technically defined by the U.S. EPA as the Risk Specific Concentration or RsC (U.S. EPA, 1992a). Risk Specific Concentrations, as reported by the U.S. EPA, are generally calculated for a lifetime risk that does not exceed 1 in a million (10^{-6}) although it is generally agreed today that higher *de minimis* risk estimates (e.g., 10^{-4}, 10^{-5}) may be acceptable for certain compounds based on risk management considerations (e.g., technical feasibility and socio-economic considerations). In fact, some agencies consider the range of risks comprised between 10^{-4} and 10^{-6} as a "grey zone", an action range within which various extra-scientific considerations influence the decision process.

When considerations such as sampling, analytical requirements, modelling, control and monitoring, and availability of resources are of concern to regulatory agencies, it is a widely accepted practice to use annual average values as a surrogate for continuous exposure concentrations. The annual average value approach has been adopted by various regulatory agencies in order to set standards for carcinogens and systemic toxicants producing adverse effects following long-term exposure (CAPCOA, 1992, 1987; NYSDEC, 1991; MDEP, 1990). In this approach, the assumption is made that biological effects are strictly related to the cumulative dose (Concentration x Time), that is, a high dose of a carcinogen received over a short period of time is equivalent to a corresponding low dose spread over a lifetime. This approach becomes problematic as the exposures in question become more intense but less frequent, especially when there is evidence that pharmacokinetics are altered and that the agent has shown dose-rate effects (U.S. EPA, 1986). As a result, the annual average value may not be appropriate for some air contaminants as

it does not account for health effects that may occur or be triggered as a result of short- and medium-term exceedances in the levels of chemicals emitted, or intermittent exposure scenarios.

Approaches that have been suggested in order to reduce the uncertainties associated with these exposure scenarios include the development of daily (24 hour) ambient air concentrations corresponding to a predetermined lifetime excess cancer risk level. Averaging air concentrations over a 24 hour period better reflects experimental exposure protocols used in the derivation of RsC values and, when enforced, allow a better control of exceedances. In practice, for airborne carcinogens, the most appropriate 24 hour-based air concentration would correspond to the RsC value.

Whenever possible, the 24 hour-based AAQC or its equivalent as reported in the current ARB/OMOE listing of standards/interim standards will be used for the purpose of the current review when comparing Ontario values to those computed by other jurisdictions for carcinogenic compounds, unless otherwise stated. Air contaminants retained in the Carcinogens group are listed in Appendix B.

2.2.2 Contaminants Based on Health Effects and Other Criteria

Contaminants grouped in these categories are those for which standards and interim standards were based on effects other than cancer.

Health-based contaminants may display a combination of long-term (chronic) and short-term (acute) systemic and local effects. Accordingly, the most appropriate time periods retained in the current Identification Process to compare short- and long-term effects were the one-hour average value and the 24 hour average value, respectively, as reported in the ARB/OMOE listing. It should be noted that other regulatory agencies have used the 24 hour value averaged over a one year-period to address long-term systemic effects (CAPCOA, 1992, 1987; NYSDEC, 1991; MDEP, 1990). This effectively represents a compromise for the more stringent time periods generally recommended by the U.S. EPA and other organizations such as WHO and FDA (e.g., use of the **daily** Reference Dose, RfD, or the Allowable Daily Intake, ADI; **daily** Reference Concentration, RfC; shorter exposure periods such as the TLV-STEL and TLV-Ceiling for highly irritating compounds) (U.S. EPA, 1992; ACGIH, 1992). In the current review, contaminants shown to display more than one end-point (*e.g.,* chronic and acute effects) will be identified and addressed accordingly.

For contaminants based on criteria other than health, considerations pertaining to time-weighted-averages were evaluated on a case-by-case basis depending on the nature of the effect and the receptor being considered. Standards and interim standards based on health and other effects are listed in Appendix C, D, E, and F.

2.3 Framework for the Evaluation of Air Contaminants

2.3.1 Carcinogens

The methodology adopted in the present review to assess the relevance of ARB/OMOE standards and interim standards classified in the Carcinogens group makes use of the extensive amount of scientific information that was developed, reviewed, and made available by various recognized regulatory agencies. The information of interest are the weigh-of-evidence, carcinogenic classification (the "recognized" or "probable" human carcinogen classes), and the levels of exposure associated with a predetermined level of risk. Genotoxicity data were not considered unless otherwise stated.

The level of exposure that was judged the most appropriate to address exposure to carcinogenic

compounds was the Risk Specific Concentration (RsC), as defined by the U.S. EPA (U.S. EPA, 1992a, 1992b). For the purpose of the current Identification Process the RsC retained was associated with an excess lifetime cancer risk of 10^{-5}. Although this level of risk is generally deemed acceptable by regulatory agencies, its use in the current context is based on practicalities and should not be interpreted as a general ARB/OMOE policy. When not available, RsCs were computed from the inhalation unit risk factors reported by the California Department of Health Services (CAPCOA, 1992). In the absence of data pertaining either to RsCs and inhalation unit risk factors, RsCs were estimated by using oral potency factors to calculate Risk Specific Doses (RsD) which, thereafter, were converted to the inhalation value by assuming a 70 kg person breathes 20 m^3 of air per day and equal absorption occurs by the inhalation and oral routes. It should be noted that numbers derived with the later approach are used only for comparison purposes in the context of the current review. They do not represent desirable or expected guidelines and/or objectives for air contaminants due to the high degree of uncertainty related to parameters such as pulmonary bioavailability (including pulmonary processing of chemicals adsorbed on particles); portal-of-entry effects; possible differences in: target organs, distribution, metabolism, excretion; possible differences in the mechanisms of action and hence in the relevant end-points.

In conjunction with the parameters stated above, several others were extracted from the rationales used to support the development of ARB/OMOE standards and interim standards. These are summarized as follows:

- Limiting Effect (LE): indicates whether ARB/OMOE values were based on health effects (H), and if so, whether the end-point retained for standard/interim standard development was based on carcinogenesis (C) or non-carcinogenic effects (NC);

- AAQC: lists the actual ARB/OMOE Ambient Air Quality Criteria (in ug/m^3) set to prevent the occurrence of the effect (LE) following short and/or long-term exposure when such information was provided in the corresponding rationales. AAQC was generally reported as the 24 hour value (for long-term effects) unless otherwise stated;

- /year: lists the ARB/OMOE AAQC annual average value (when available) set to prevent the occurrence of the effect (LE) following long-term exposure;

- Year of proposal: year when the standard/interim standard was officially adopted by the OMOE. This parameter was used to evaluate the time (in years) elapsed since the rationale was proposed. It serves as an indicator of whether the current values should be updated (especially for those highly documented chemicals such as PCDDs, PAH, etc.);

- AAQC/RsC: is the ratio of the actual AAQC to the listed RsC.

These various parameters were summarized for each contaminant evaluated (see Appendix B) and served as a basis for the evaluation of the ARB/OMOE values. The final evaluation was performed by combining the above information with data, views, limitations, and recommendations contained in the rationales and data-bases and, at this stage, the final classification (see below) was based mainly on professional judgement. Commentaries that support the final decision adopted for specific air contaminants are reported in the tables.

Following this process, contaminants were attributed to a class for review, update, or assessment. These classes are defined as follows:

- Class A: it is proposed that the interim standard be adopted as a standard.

  This case applies to air contaminants for which: 1) there is substantial information

indicating that the AAQC and its supporting rationale is scientifically valid and defensible; 2) the toxicological data-base supporting the AAQC is adequate and sufficient and no significant changes in the AAQC value is expected in the foreseeable future as new information becomes available; 3) considerations related to feasibility and socio-economic factors are considered negligible according to ARB management and, therefore, should not significantly alter the original AAQC value; 4) the AAQC rationale needs minimal additions/formatting prior to rigorous scientific scrutiny by external parties.

These requirements for standard setting are important as it is the general understanding that, once adopted, standards (as opposed to interim standards or guidelines) will be more difficult to modify as new toxicological data becomes available; there would be little flexibility in the application of standards to allow for the most current toxicological information; and, the adoption of standards will require an extensive administrative effort on OMOE part as well as external reviewers, both in terms of staff resources, time and money. It is worth mentioning that for the above stated reasons, few regulatory agencies have adopted standards; they generally propose interim standards, better known under these jurisdictions as: Annual Guideline Concentration (AGC) and Short-term Guideline Concentration (SGC) (NYSDEC, 1991); Allowable Ambient Limit (AAL) (MDEP, 1990); Screening Cancer Potency Values (SCPV), Non-Cancer Acceptable Exposure Levels (NAEL) for acute and chronic effects (CAPCOA, 1992), to name just a few.

* Class B: the standard/interim standard requires substantial reduction and/or reassessment.

  Generally applies to the following situations, although other factors may be taken into account as determined by professional judgement: different end-points are reported and/or substantial differences are observed between standards/interim standards and recommended or estimated RsC (or RfC) values.

* Class C: the standard/interim standard should be reviewed

  Generally applies to the following situations, although other factors may be taken into account as determined by professional judgement: 1) comparable end-points/rationales are reported along with low differences between standard/interim standard and RsC values (AAQC/RsC < 10), but a significant time period elapsed since the rationale was proposed; 2) acceptable AAQC/RsC ratios are reported (i.e., < 10), however, rationale was found missing and/or the toxicological information reported is inadequate and do not allow recalculation of the AAQC. Air contaminants may also be included in Class C when it is judged that toxicological data pertaining to the pulmonary route is inadequate and that extrapolation between routes of exposure may not be appropriate, thus requiring dosimetric corrections.

* Class D: the status of the standard/interim standard should remain unchanged as no adequate scientific information is available.

Results pertaining to the classification of Carcinogens for review/update or assessment are reported in Section 3. Details are provided in Appendix B.

2.3.2 Contaminants Based on Health Effects and Other Criteria

For those air contaminants for which standards/interim standards were based on effects other than cancer, the framework adopted was similar as that introduced in the preceding section. Limiting effects (LE), AAQC values (24 hour and shorter average values), /year values (when provided), and Date of Proposal were

considered in the preliminary assessment process (see tables in Appendix C, E, and D, F for health-based standards/interim standards and standards/interim standards based on other effects, respectively). Additional information pertaining to each class follows.

2.3.2.1 Health-Based Contaminants

In order to compare the ARB/OMOE standards/interim standards to the actual benchmark values developed and recommended by other regulatory agencies, Reference Concentrations (RfCs), when available, along with the associated information was reported. When an RfC value was not available for a specific air contaminant, a provisional RfC was estimated from a Reference Dose (RfD) by assuming that a 70 kg person breathes 20 m^3 of air per day and equal absorption occurs by the inhalation and oral routes. As mentioned previously, this procedure for calculating permissible air levels is provisional and should not replace RfC values derived from inhalation studies or computed from other experimental scenarios that take into account appropriate dosimetric factors for inter-routes of exposure (US EPA, 1991).

Values obtained from the following regulatory agencies were retained for comparison purposes: the U.S. Environmental Protection Agency (US EPA, 1992a, 1992b); the World Health Organization (WHO, 1987); the California Department of Health Services (CAPCOA, 1992; listed under CA); the Food and Drug Administration, FDA (no summary document available; data obtained through various sources); and the Massachusetts Department of Environmental Protection (MDEP, 1991; listed as MASS). Occasionally, values provided by the New York State Department of Environmental Conservation (NYSDEC, 1991) were utilized. When data were not available from these agencies, occupational exposure limits (listed as OEL) were used (ACGIH, 1992). In this case, provisional RfC values were calculated by averaging the Threshold Limit Value-Time Weighted Average (TLV-TWA) or its equivalent for continuous exposure. The procedure proposed by the California Air Pollution Officers Association (CAPCOA, 1992) was adopted and TLVs were divided by a factor of 420 [4.2 (to extrapolate from a 40 hour work week to a 168 hour full week) times 10 (to extrapolate from healthy workers to sensitive members of the population) times 10 (since adverse health effects are often seen at the TLV)].

When different values for the same chemical were available from different regulatory agencies, priority was given to those agencies whose mandate is the development and implementation of scientifically defensible standards and/or guidelines for environmental contaminants. These include, in decreasing order of priority:

1) U.S. EPA

2) World Health Organization

3) California Department of Health Services

4) New York State Department of Environmental Protection

Allowable Daily Intake (ADI) values were used for estimating RfCs, when judged appropriate, due to the high quality of the review process generally adopted by the U.S. FDA. Occupational exposure limits (OEL) and values derived by the Massachusetts Department of Environmental Protection (MDEP, 1991) (based on OEL) were used only when data pertaining to permissible levels for environmental exposure were not available.

The various RfCs, either proposed or estimated, were reported in the tables along with the corresponding end-points. The RfC that was judged to be the most relevant (MR) for comparison with the corresponding AAQC was subsequently identified. Various parameters pertaining to the study used to derive that RfC were also listed in order to judge the adequacy of the data-base. Parameters evaluated include: nature of the toxicological end-point (e.g., systemic), mode of exposure (e.g., inhalation), and duration of exposure

(e.g., chronic). Parameters evaluated but not reported/discussed include biological, biochemical, and pathological findings; and the confidence rating attributed (e.g., by the US EPA) to the data base used for RfD/RfC derivation. As a final step in the evaluation process, the overall data above discussed was synthesised and integrated into the following parameters:

- Time: time (in years) elapsed since the ARB/OMOE rationale was proposed (indicates whether the current values should be updated, especially for those highly documented chemicals);

- LE/EP: indicates whether there is a difference between the AAQC limiting effect (LE) and RfC end-point (EP);

- AAQC/MR: is the ratio of the actual AAQC to the most relevant (MR) RfC.

Following this process, contaminants were attributed either to Class A, B, C, or D as previously discussed for carcinogenic compounds. Commentaries that support the final decision adopted for specific air contaminants are reported in the tables.

Results pertaining to the classification of health-based standards and interim standards for review/update or assessment are reported in Section 3. Details are provided in Appendix C and E.

2.3.2.2 Contaminants Based on Other Effects

A substantial number of standards/interim standards were based on effects other than health and, as such, a review was carried out in order to evaluate their relevance for protecting against health effects. The approach consisted of:

1) determining whether ARB limits based on effects other than health are protective enough when compared to recent data related to health effects;

2) determining whether health-based ARB limits (when reported along with other-effects values)) are still valid when compared to recent data on health effects.

In order to address the first issue, values for odour, total suspended particulate (TSP) and others were updated with the most recent data from the open literature, when available, and appropriate OMOE data-bases as indicated in Appendix D, F, G, and H. In cases where health-based values were also reported, a procedure similar to that introduced previously for health-based standards/interim standards was adopted (See Appendix D and F). In cases where it was judged necessary to consider different end-points for the same chemical (*e.g.,* odour and health-based numbers), appropriate averaging times and values were computed. In the case of odour, which is considered a limiting effect of concern, a detailed review of the threshold values available in the literature is presented in Appendix H and G for standards and interim standards, respectively. Details related to this review are presented in the following section.

2.3.2.3 Review of the Odour Basis of Interim Standards and Standards

Odour threshold research is an evolving science. There are a large number of odour threshold value compilations available. These values often range over several orders of magnitude. Historically, regulatory agencies tended to select from one or the other of the available compilations as a basis of their odour guidelines. With time, odour threshold values come to be considered physical constants instead of the statistical best estimate value they represent. Furthermore, none of the compilations have critiqued the odour threshold values on the basis of their experimental design.

These shortcomings apply to the Ministry's selection of odour threshold values, over the years, from several such compilations.

Critiquing the experimental design of odour threshold determinations reported in the literature, provides a basis for developing a best estimate of odour thresholds and represents a necessary refinement of the data available in odour threshold compilations. In 1989, the American Industrial Hygiene Association (AIHA, Odour Thresholds for Chemicals with Established Occupational Health Standards, 1989) carried out a review of the major sources of odour threshold data compilations. The study included 191 primary sources of odour threshold measurement data and its main aim was to collate all reports that had adopted good odour evaluation practices. They drew up thirteen conditions that any given odour impact study should have addressed. Of these, three were listed as a minium requirement for acceptance into the AIHA final compilation. These are as follows:

1) An odour panel must have been used in the odour evaluation process, and this panel should have been comprised of at least five judges.

2) A concentration presentation procedure must have been used to avoid olfactory fatigue.

3) A maximum of a three-fold increase should have been used to separate the different sample concentrations.

From the 191 primary sources, 155 publications were excluded as unacceptable and all acceptable values for odour thresholds came from the remaining 36 sources. In general, the study recommended the final odour thresholds to be the geometric mean of the range of values which came from the acceptable studies.

This AIHA compilation was chosen as the starting point in our review and assessment process. The odour impact studies, recently carried out by Ortech International, has also been incorporated along with the odour data in an extensive compilation by Ruth et al. Although the AIHA approach was quite rigorous, the results from the above mentioned sources have been used to further substantiate the AIHA results.

The initial end product of this review is expected to be a 10 minute odour based Ambient Air Quality Criteria (AAQC), or 10 minute Standard which, essentially will be the best estimate of the odour threshold. A 1 hour AAQC or Standard will be developed also, by taking 1/4th to 1/8th (eg. 1/6th - *to be finalized*) of the 10 minute AAQC/Standard value.

A generic approach has been developed for selecting the 10 minute AAQC/Standard. The approach includes consideration of the range of acceptable values and the geometric mean from the AIHA study and cross-checking whether the Ortech International odour panel study results fall in the range of acceptable concentrations.

A decision making pathway, showing how the various odour data from AIHA, Ortech International and the Ruth review can be used to select the 10 minute Ambient Air Quality Criteria/Standard, is presented in Figure 2.2. Additional considerations, which may be applied subsequent to the pathway results include the following.

If any of the following conditions exist, one may leave the value of the existing standard/interim standard unchanged:

1) If an elevated value is indicated by the pathway but it is within 2-fold of the existing value;

2) If an 'interim' value is indicated (eg. no AIHA value available) by the pathway, resulting in

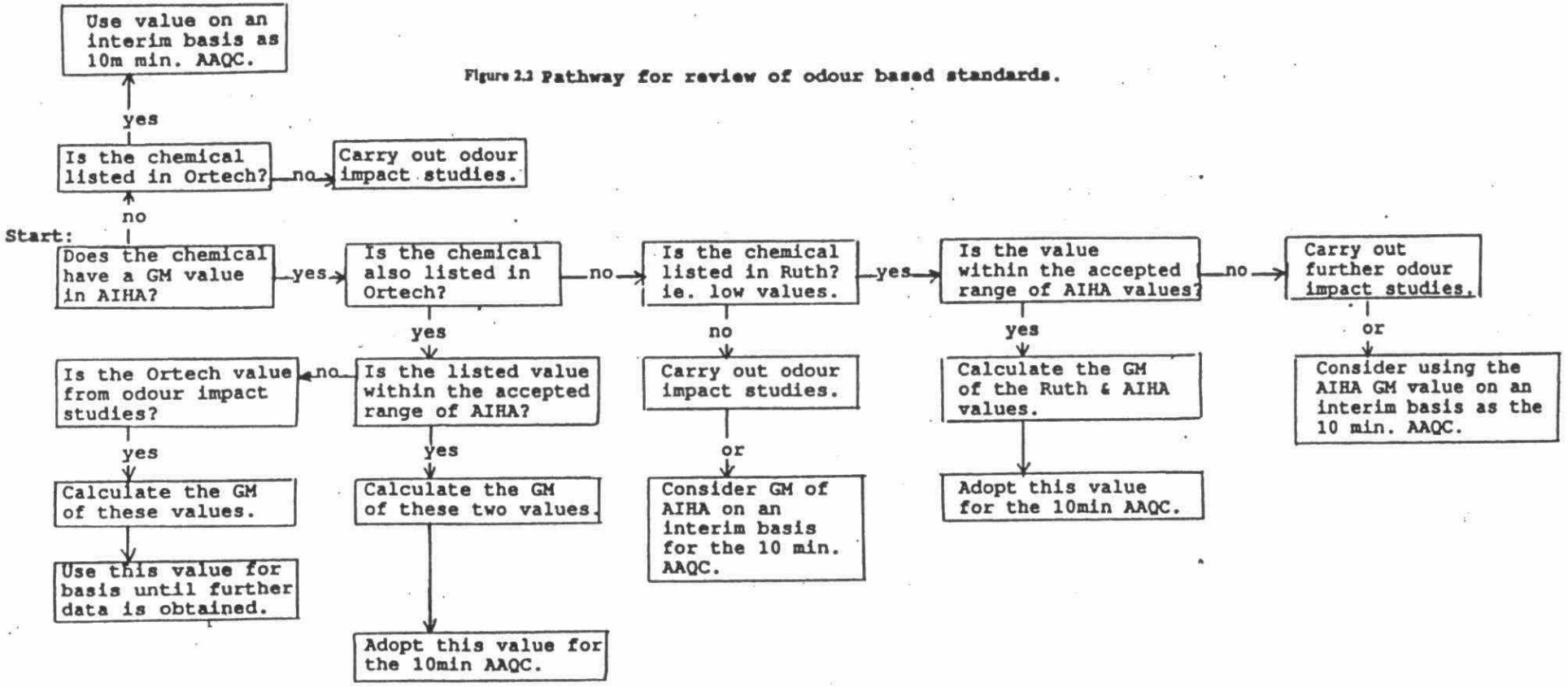

Start:
Does the chemical have a GM value in AIHA?
yes
Is the chemical also listed in Ortech?
no
Is the chemical listed in Ruth? ie. low values.
yes
Is the value within the accepted range of AIHA values?
no
Carry out further odour impact studies.
or
Consider using the AIHA GM value on an interim basis as the 10 min. AAQC.
yes
Is the listed value within the accepted range of AIHA?
no
Is the Ortech value from odour impact studies?
yes
Calculate the GM of these values.
Use this value for basis until further data is obtained.
yes
Calculate the GM of these two values.
Adopt this value for the 10min AAQC.
no
Carry out odour impact studies.
or
Consider GM of AIHA on an interim basis for the 10 min. AAQC.
yes
Calculate the GM of the Ruth & AIHA values.
Adopt this value for the 10min AAQC.
no
Carry out odour impact studies.
Is the chemical listed in Ortech?
yes
Use value on an interim basis as 10m min. AAQC.

Figure 2.1 Pathway for review of odour based standards.

GM = Geometric mean value.

Note: If this approach yeilds a 10 min. AAQC value which exceeds the 50% complaint level of Ortech, then this would be regarded as unacceptable.

an elevation larger than 2-fold;

3) If a reduction is indicated by the pathway which is less than 20%.

Appendix G for interim standards and Appendix H for standards summarize the available information and shows the results of applying the proposed pathway and, in some cases, the above noted additional considerations for classifying the chemicals into the following groups (ie. denoted by A, C and D).

For Interim Standards:

- Group A Denotes that the interim standard be adopted as a standard;
- Group C Denotes that an update is required before conversion to a standard or development of an odour based standard is required if one is not available;
- Group D Denotes that the status should remain unchanged.

For Standards:

- Group C Denotes that an update is required;
- Group D Denotes that the status should remain unchanged.

3. RESULTS

Results obtained are presented based on the primary classification scheme that was presented in Figure 2.1. According to this scheme, air contaminants were divided into standards and interim standards. They were further subdivided into carcinogens, health-based air contaminants, and contaminants based on effects other than health. Figure 3.1 provides a quantitative summary of the distribution of air contaminants addressed in this review.

3.1 Interim Standards

There were 204 air contaminants identified as interim standards in the document "Summary of Point of Impingement Standards, Ambient Air Quality Criteria (AAQCs), and Approvals Screening Levels (ASLs)" (ARB, Ontario Ministry of the Environment, August 1992). Among these, half (101 [50%]) were based on health criteria; 76 (37%) were based on effects other than health; and 27 (13%) were identified as "recognized" or "probable" human Carcinogens (Table 3.1).

Table 3.1. Primary Classification of Interim Standards and Attribution for Review, Update, and Assessment

INTERIM STANDARDS = 204											
Health-Based = 101 (50%)				Carcinogens = 27 (13%)				Other Effects = 76 (37%)			
A	B	C	D	A	B	C	D	A	B	C	D
9	26	53	13	0	13	11	0 (3)*	1	30	37	8

* 3 contaminants are currently under review

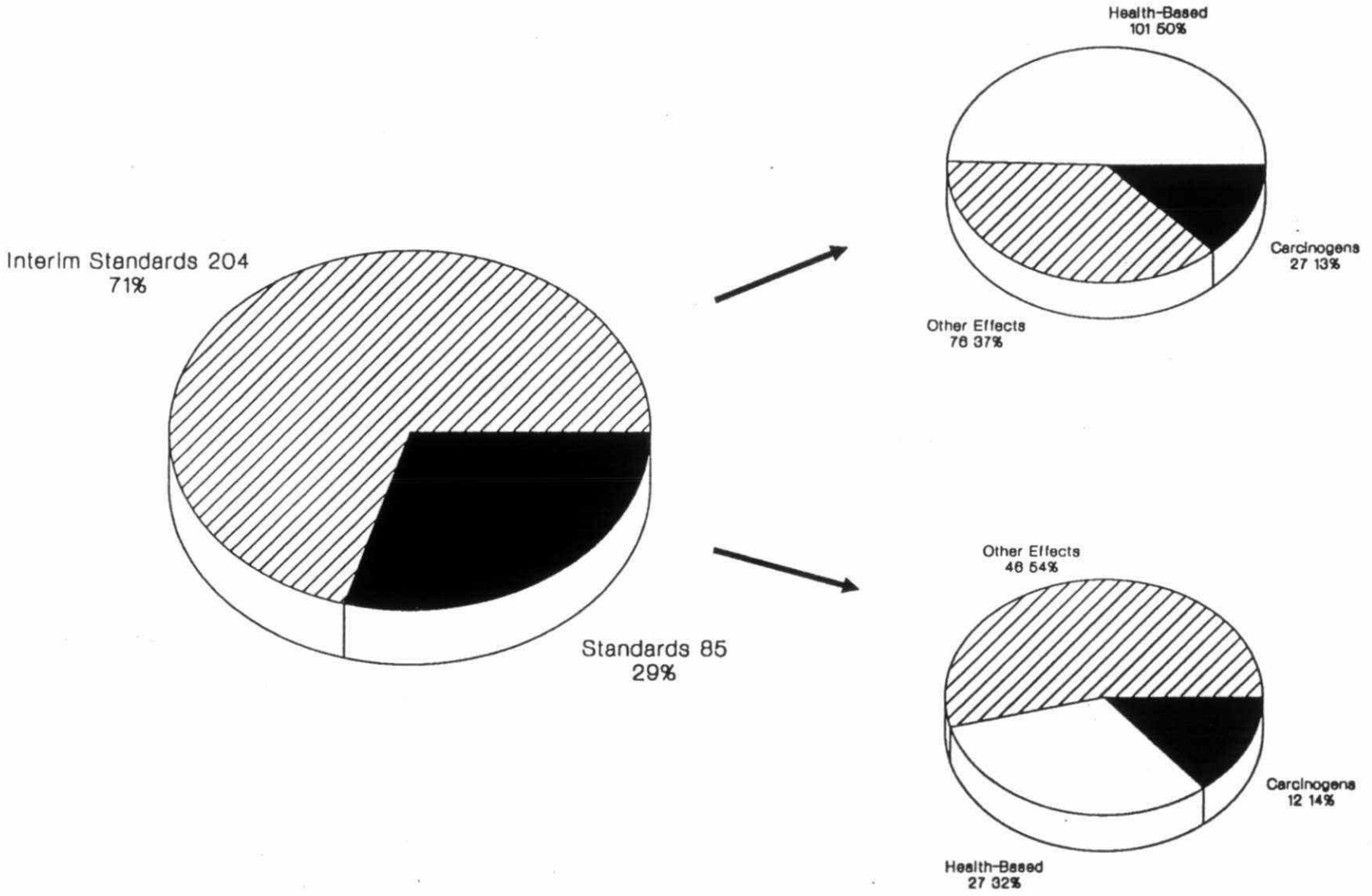


Figure 3.1 Distribution of Standards and Interim Standards

Further evaluation of these groups for review/update and assessment is reported in Table 3.1. Hence, 9 interim standards whose criteria is based on health effects, and 1 interim standard based on effects other than health, for which the supporting toxicological information was judged adequate, defensible and/or in line with other regulatory agencies are proposed for transformation into standards (Class A). None of those interim standards grouped into the "Carcinogen" group were judged adequate for direct transformation into standards as they require either review/update (Class C), a complete reassessment (Class B), or the current scientific information was judged insufficient for standard setting (Class D) (for details see Appendix B, C and D). Interim standards grouped in Class A are summarized in Table 3.2.

The number of air contaminants requiring updated information in order to bring them in-line with current scientific and regulatory knowledge (Class C) are presented in Table 3.1. Hence, 53 Health-Based interim standards, 11 Carcinogens, and 37 interim standards based on effects other than health will require review/update. For several Class C interim standards, the review may be achieved in a relatively short time as the only requirement may be recalculation of the AAQC with different uncertainty factors (UF) or an update based on the most recent scientific and regulatory information available from secondary sources; in other cases, however, when it was estimated that portal-of-entry effects may be of concern as suggested by physico-chemical, biological, biochemical, toxicological, and pharmacokinetics data, considerations for inter-routes of exposure (e.g., dosimetry adjustments) will be addressed in order to estimate provisional RfC-equivalent values (U.S. EPA, 1991).

As indicated in Table 3.1, among the 204 interim standards, it was determined that 26 health-based interim standards, 13 carcinogens, and 30 interim standards based on effects other than health will require complete reassessment (Class B); 13, 0, and 8 interim standards included in these respective classes should remain unchanged due to the unavailability of relevant data. Figure 3.2 summarizes the actual number of interim standards attributed either to Class A, B, C, or D.

It should be reminded at this point that the final classification of AAQC's for review/update or assessment was based on the overall information evaluated following integration of the various parameters listed in the appendix with the specific information reported in the supporting rationales. In other words, factors such as time elapsed since the rationale was proposed, AAQC/MR (RsC) ratios; and differences in end-point (LE/EP) were not the only factors used in the judgemental process, although it is clear that the use of these parameters provides some insight into the potential classification scheme of an air contaminant.

This concept is best illustrated in Figure 3.3 where interim standards identified as Class B and Class C carcinogens are plotted as a function of the above stated parameters. It can be observed that all the carcinogens grouped in Class B for reassessment (left half of the graph) display non-carcinogenic end-points (LE/EP = Yes), that the AAQC/RsC ratios vary between 37 and 1875 (geometric mean = 1000), and that at least six years elapsed since the last rationale was proposed (geometric mean = 10 years). On the other hand, carcinogens for which the above stated parameters were available and that were grouped in Class C for review/update have their AAQC based on carcinogenesis (right half of the graph), AAQC/RsC ratios that vary between 0.04 and 1111 (geometric mean = 173), and elapsed times that vary between 3 and 13 years (geometric mean = 8.5 years).

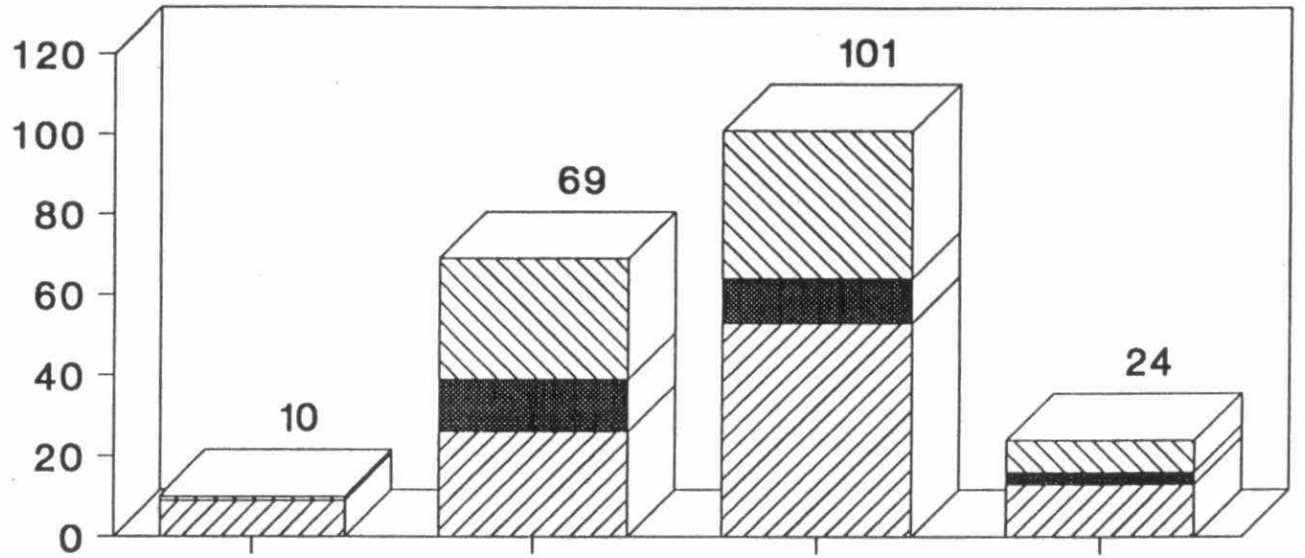
Among the Class C carcinogens, methylene chloride had its end-point based on non-carcinogenic effects (carboxyhaemoglobin), an AAQC/RsC ratio of 88, and an elapsed time of 4 years. Despite the fact that this chemical had an end-point different from carcinogenesis, it was assigned to Class C for review-update. This decision was based on the high quality of the supporting rationale which includes a thorough analysis of toxicological end-points, mechanisms of action, and ADME concepts based on novel approaches such as physiologically-based pharmacokinetics (PB-PK) modelling. In this case it was deemed inappropriate to carry out a complete reassessment of the available literature on methylene chloride although a review of the most updated regulatory data is mandatory for the development of an AAQC based on carcinogenesis.

Table 3.2. Final Classification of Interim Standards for Review/Up-Date and Reassessment

Health-Based Interim Standards			
Class A	**Class B**	**Class C**	**Class D**
Borax	Acrolein	Benzothiazole	Barium (tot. water soluble)
Boric acid	Bromacil	Chlordane	Captan
Citric acid	Cyclohexane	Cyanogen chloride	Dimethyl-methylphosphonate
Cobalt	Dichlorobenzene ortho	Diazinon	Freon 22
Ethylene glycol dinitrate	Dimethyl-1,3-diamino propane	Dibutyl phtalate (DBP)	Dalapon sodium salt
Hydrogen bromide	Ethylanthraquinone, -2	Dibutyltin dilaurate	Decene, -1
Nitroglycerin	Ethylene glycol butyl ether	Diethyl phthalate (DEP)	Detergent enzyme
Oleic acid	Ethylene glycol butyl ether acetate	Diethyle. glycol monobutyl ether	Freon 114
Propylene glycol	Haloperidol	Diethyle. glycol monobutyl ether acetate	Freon 12
	Hexamethyl disilazane	Diexyl phthalate (DHP)	Dimethyl phthalate (DMP)
	Hexamethylene diisocyanate trimer	Dimethyl acetamide, n,n-	Naphthalene
	Hexane	Dioxolane-1,3	Tetramethyl disulphide
	Hexylene glycol	Diphenylamine	Trichlorofluoromethane
	Maleic anhydride	Diquat dibromide, respirable	
	Methyl bromide	Diquat dibromide, total	
	Monochlorobenzene	Dodine	
	Napthol, alpha	Droperidol	
	Palladium-water soluble Pimozide	Ethyl. glyc. ethyl ether	
	Propyl alcohol	Ethyl. glyc. ethyl ether acetate	
	Sodium chlorate	Fentanyl citrate	
	Sodium chlorite	Glutaraldehyde	
	Stannous chloride	Hexachlorocyclopentadiene	
	Tetrabutylurea	Hexamethylene diisocyanate-monomer	
	Tolmetin sodium	Hydrogen peroxide	
	Tripopyltin methacrylate	Manganese compounds	
		Methane diphenyl diisocyanate	
		Methyl chloride	
		Methyl ethyl ketone peroxide	
		Methyl salicylate	
		Methylal	
		MMT	
		Miconazole nitrate	
		Mineral spirits	
		Nitrous oxide	
		Octene, -1	
		Oxalic acid	
		Paraquat dichloride, respirable	
		Paraquat dichloride, total	
		Penicillin	
		Pentachlorophenol	
		Phosphine	
		Phosphorus oxychloride	
		Phosphorus pentachloride	
		Platinum-water soluble-compounds	
		Pyridine	
		Selenium	
		Silane	
		Sulfur hexafluoride	
		Trichlorobenzene, 1,2,4-	
		Trimethylol propane	
		Vinylidene chloride	
		Warfarin	
		Zinc chloride	

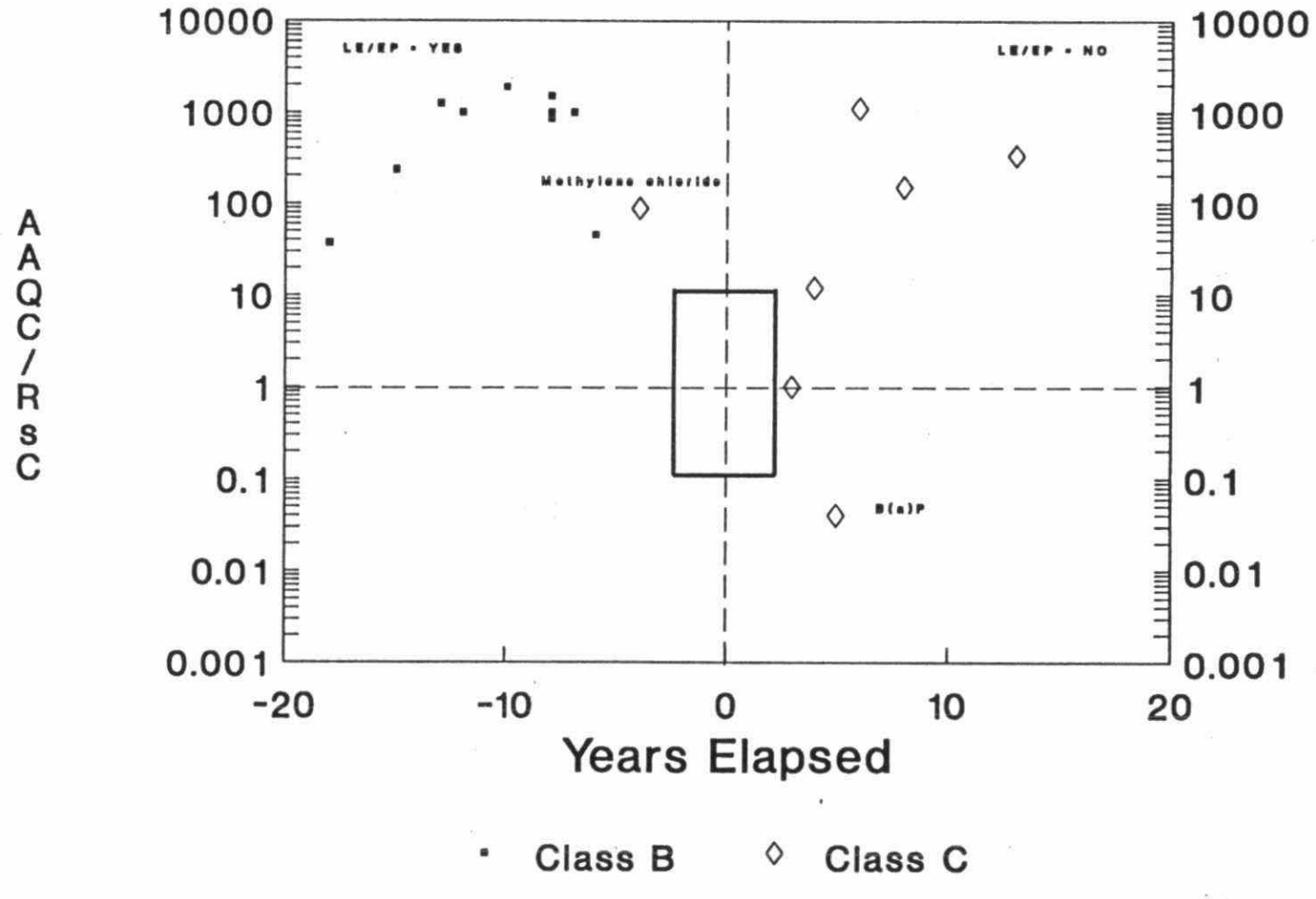
Interim Standards Based on Effects Other than Health			
Class A	**Class B**	**Class C**	**Class D**
Whey powder	Alkyltoluene sulphonamide Amyl acetate, *iso-* Amyl acetate, *n-* Amyl acetate, *sec-* Butanol, *iso-* Butanol, *n-* Butyl stearate Diethylamine Dimethylamine Dimethyl ester Dodecyl benzene sulphonic acid Ethyl ether Ethyl hexanol, 2- Ethyl-3-ethoxy proprionate Ethylene glycol Fluorinert Isobutyl acetate Isopropyl acetate Isopropyl benzene Mercaptobenzothiazole disulfide Metaldehyde Methacrylic acid Methyl mercapto aniline Methyl-2-hexanone, 5- Methyl-2-pyrrolidone, *n-* Molybdenum Polychloroprene Propylene glycol methyl ether Propylene glycol methyl ether-acetate Trimethyl amine	Aluminium oxide Ammonium chloride Benzoyl chloride Biphenyl Calcium carbide Calcium cyanide Decane, *n-* Diacetone alcohol Dibutylamine Diethylene glycol monoethyl-ether Diethylene glycol monoethyl-ether acetate Diisobutyl ketone Ethanol Ethylene glycol monohexyl ether EDTA Methoxychlor Methyl isobutyl ketone Methyl-n-amyl ketone Octane Polybutene-1-sulphone Potassium cyanide Potassium hydroxide Potassium nitrate Propanol, *iso-* Propionaldehyde Propionic acid Propionic anhydride Sodium bisulphite Sodium cyanide Sodium hydroxide Strontium Strontium carbonate Strontium hydroxide Strontium oxide Sulphamic acid Total Reduced Sulphur Trimethylbenzene, 1,2,4-	Acetophenone Butanol, *tert-* Butyl acetate, *n-* Butyl acrylate Chloramben Gasoline Malathion Methyl styrene, alpha
Interim Standards Classified as Probable or Recognized Human Carcinogens			
Class A	**Class B**	**Class C**	**Class D**
	Acrylonitrile Asbestos Benzene Carbon tetrachloride Chloroform Chromium VI Dioxane, 1-4 Ethylene dichloride Ethylene oxide Lindane Methylene-bis-2-chloroaniline Perchloroethylene Propylene oxide	Arsenic + compds Benzo(a)pyrene Diethylhexylphtalate Methylene chloride Methylene dianiline Cristobalite Quartz Tridymite Talc-fibrous Thiourea Vinyl chloride	PCDDs/PCDFs Coal tar volatiles PCBs

Figure 3.2 Cumulative Number of Interim Standards for Review and Assessment



	Class A	Class B	Class C	Class D
Other Effects	1	30	37	8
Carcinogens	0	13	11	3
Health-Based	9	26	53	13

Figure 3.3 Class B and Class C Carcinogens as a Function of Various Parameters



Another example of the approach used for classifying air contaminants is provided by benzo(a)pyrene. The standard-setting process for this contaminant is presently in a state of flux due to wide divergences in the interpretation of toxicological data. The OMOE AAQC value, which was based on carcinogenesis, is 25-fold lower than the value set by the State of California (AAQC/RsC = 0.04, see Figure 3.2). Although it is expected that the OMOE value would provide adequate protection for human exposure to B(a)P, the AAQC value was based on one potency factor as compared to the EPA value which was the geometric mean of four different potency factors (the CA value was based on the EPA evaluation). Furthermore, the AAQC was computed for an excess cancer risk of 10^{-6} although it is becoming generally accepted that lower excess cancer risks (e.g., 10^{-5}) may be appropriate from a public health point of view. Finally, B(a)P is a high-profile contaminant, relatively well documented, and it is plausible, therefore, that a large amount of data has been published within the past 5 years which may warrant review/update. Based on these considerations, and although the AAQC/RsC ratio could be adequately protective for humans, it was judged necessary to review the more recent and relevant regulatory data pertaining to B(a)P before taking any decision on whether it should be kept as an interim standard or proposed for adoption as a standard. This chemical was therefore assigned to Class C.

These examples emphasize that class assignment for air contaminants was performed by considering and integrating all the information available on that specific chemical.

A summary of Class A, B, C, and D interim standards is reported in Table 3.2.

3.1 Standards

There were 85 air contaminants identified as standards in the document "Summary of Point of Impingement Standards, Ambient Air Quality Criteria (AAQCs), and Approvals Screening Levels (ASLs)" (ARB, Ontario Ministry of the Environment, August 1992). Among these, 27 (32%) were based on health criteria, while a majority of 46 (54%) were based on effects other than health; 12 (14%) were identified as "recognized" or "probable" human Carcinogens (Table 3.3).

Table 3.3. Primary Classification of Standards and Attribution for Review, Update, and Assessment

STANDARDS = 85											
Health-Based = 27 (32%)				Carcinogens = 12 (14%)				Other Effects = 46 (54%)			
A*	B	C	D	A*	B	C	D	A*	B	C	D
0	9	9	9	0	8	3	1	0	5	22	19

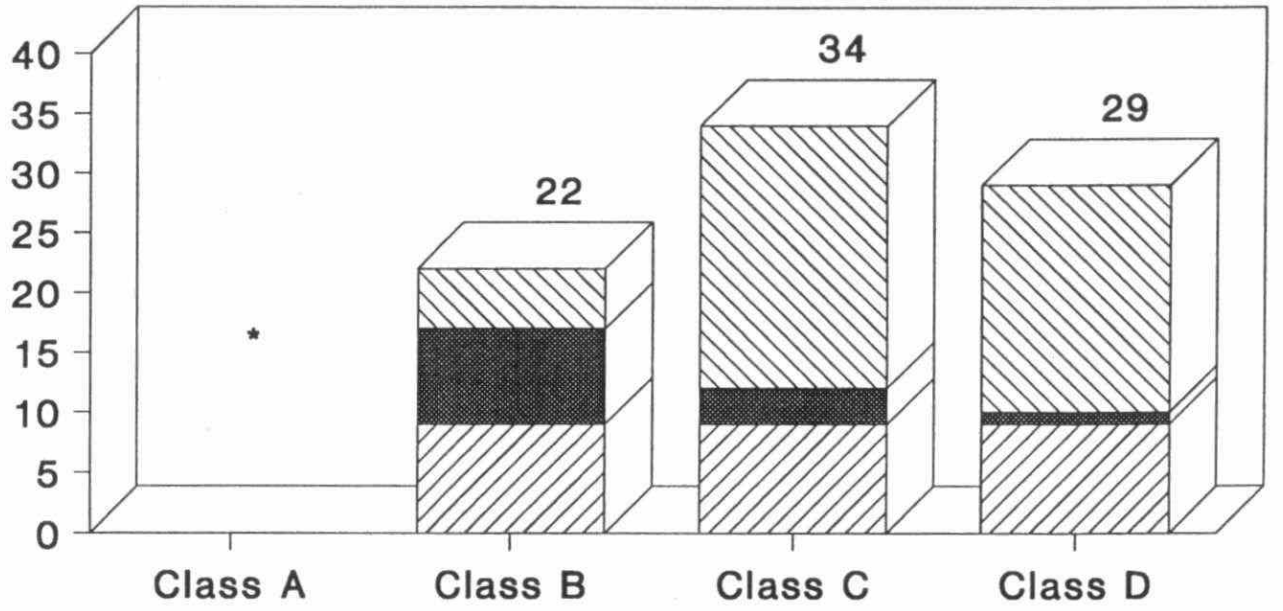
* Not applicable for standards

The number of standards requiring updated information in order to bring them in-line with current scientific and regulatory knowledge (Class C) are presented in Table 3.3. Nine (9) Health-Based standards, 3 Carcinogens, and 22 standards based on effects other than health will require review/update. For several Class C standards, the review may be achieved in a relatively short time as the only requirement may be recalculation of the AAQC or an update based on the most recent scientific and regulatory information available from secondary sources; in other cases, however, when it was estimated that portal-of-entry effects may be of concern as suggested by physico-chemical, biological, biochemical, toxicological, and pharmacokinetics data, considerations for inter-routes of exposure (e.g., dosimetry adjustments) will be

Table 3.4 Final Classification of Standards for Review/Up-Date and Reassessment

Health-Based Standards			
Class A	Class B	Class C	Class D
Does not apply for standards	Arsine Decaborane Diborane Furfuryl alcohol Lithium-other than hydrides Lithium hydrides Phenol Phosgene Trichloroethane, 1,1,1-	Bromine Chlorine dioxide Formic acid Hydrogen cyanide Mercury Mercury (as Hg)-alkyl cmpds Methanol Pentaborane Vanadium	Carbon monoxide Copper Cresols Nitrogen oxides Silver Tellurium, excluding TeF_6 Tin Toluene diisocyanate Trifluorotrichloroethane
Standards Based on Effects Other than Health			
Class A	Class B	Class C	Class D
Does not apply for standards	Dicapryl phthalate Dioctyl phthalate Ethyl benzene Furfural Methyl ethyl ketone	Acetic acid Acetone Ammonia Boron Boron tribromide Boron trichloride Boron trifluoride Chlorine Dustfall Ethyl acetate Fluorine and cmpds Hydrogen chloride Hydrogen sulphide Milk powder Mercaptans (as methyl mercaptans)-total Monomethyl amine Nitric acid Propylene dichloride Sulphuric acid Tetrahydrofuran Toluene Xylenes	Acetylene Calcium hydroxide Calcium oxyde Carbon black Carbon disulphide Dimethyl disulphide Dimethyl sulphide Ferric oxide Iron-metallic Magnesium oxide Methyl acrylate Methyl methacrylate Ozone Phosphoric acid Phtalic anhydride Sulphur dioxide Suspended particulate matter Titanium Zinc
Standards Classified as Probable or Recognized Human Carcinogens			
Class A	Class B	Class C	Class D
Does not apply for standards	Acrylamide Antimony + compds Cadmium + compds Formaldehyde Nickel Nitriloacetic acid Styrene Trichloroethylene	Berylium + compds Ethyl acrylate Nickel carbonyl	Lead

Figure 3.4 Cumulative Number of Standards for Review and Assessment



	Class B	Class C	Class D
Other Effects	5	22	19
Carcinogens	8	3	1
Health-Based	9	9	9

Health-Based Carcinogens Other Effects

* Class A does not apply for standards

addressed in order to estimate provisional RsC-equivalent values (U.S. EPA, 1992).

As indicated in Table 3.3, among the 85 interim standards, it was determined that 9 health-based standards, 8 carcinogens, and 5 standards based on effects other than health will require complete reassessment (Class B); 9, 1, and 19 standards included in these respective classes should remain unchanged as they are considered adequate and scientifically defensible. Figure 3.4 illustrates the actual number of standards attributed either to Class A, B, C, or D, and a summary of these chemicals is presented in Table 3.4.

4. CONCLUSION

The results presented and discussed in the present document complete the first two steps of the review of Ontario air standards and interim standards, *i.e.,* 1) the assessment of their relevance, and, 2) the identification of those requiring updates or for which new rationales must be developed. Among the 289 chemicals reviewed, comprising 204 interim standards and 85 standards, the overall number of air contaminants that were classified in classes A, B, C, or D is summarized in Table 4.1. These results will serve as a base for subsequent procedures aimed at prioritizing chemicals for review/update and assessment.

Table 4.1 Summary of Ontario Air Contaminants Classified for Review/Update and Assessment

Air Contaminants = 289			
Class A	Class B	Class C	Class D
10	91	135	53
3%	32%	47%	18%

5. REFERENCES

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APPENDIX A

LIST OF ONTARIO STANDARDS AND INTERIM STANDARDS FOR AIR CONTAMINANTS

SUMMARY of POINT OF IMPINGEMENT STANDARDS, AMBIENT AIR QUALITY CRITERIA (AAQCs), and APPROVALS SCREENING LEVELS (ASLs).

AIR RESOURCES BRANCH

ONTARIO MINISTRY OF THE ENVIRONMENT

August 1992

The attached listings reflect the changes and additions that have been made recently by the Air Resources Branch as part of a standard setting revision process which has been undertaken during the past year.

The change of reformatting the standards related information, introduced with the August 1991 edition, is continued in this package. This change included reformatting the package into a different table (ie. Table 1), which shows clearly the various averaging times (eg. Annual, 24 hour, 1 hour, 10 minutes) of the Ambient Air Quality Criteria (AAQC) and the limiting effects associated with the POI standards and the various AAQCs, respectively. Previous 1991 changes also included a simplification of the 'Status of Limit' designations for point of impingement. All 'guidelines', 'provisional guidelines', 'tentative standards', and 'interim standards' are designated as *INTERIM STANDARDS (ie. 'IS' in 'Status' column of Table 1).* All 'standards' are designated as *STANDARDS (ie. 'S' in 'Status' column of Table 1).*

A 1991 change also included the initiation of a new type of criterion which is referred to as an Approvals Screening Level (ASL). These were previously listed in a separate Table. With this edition they are included in Table 1, with the appropriate 'ASL' designation in the 'Status' column. Specific features and uses of these ASLs are explained in the 'Preamble' below. Their primary purpose is to allow the Ministry to deal with the large number of chemicals associated with the approvals process, without having to go through a very resource intensive process of setting air quality standards. Several newly developed ASLs are included with this listing.

This listing will be issued from time to time as changes occur or as new AAQCs, Point of Impingement Standards or ASLs are developed or revised.

ASL Preamble:

APPROVALS SCREENING LEVELS FOR THE PROTECTION OF THE ENVIRONMENT AND HUMAN HEALTH

The necessity of developing air quality standards for agents which are released into the environment is well accepted. Due to the fact that standards exist for only a small select group of agents, the use of "Approvals Screening Levels" is viewed as a means of protecting the environment and its inhabitants when standards are currently not available. The features and suggested uses of these Approvals Screening Levels (ASLs) are the following:

(1) The specific use of these "Approvals Screening Levels" is for judging the acceptability of model predicted ground level concentrations (GLCs) associated with Certificate-of-Approval applications.

(2) It is imperative to note that the "Approvals Screening Level" is a value derived from a very cursory consideration of available data on human and animal toxicity, mutagenicity, reproductive, and other scientific parameters. Its derivation also takes into account occupational health and ambient air quality guidelines derived in other countries, as well as, individual odour threshold values. Key environmental effects/behaviour parameters may also be considered.

(3) The "Approvals Screening Level" value, because it is developed from a process which is not fully rigorous, is subject to more frequent re-assessment; a time limit of 5 years is foreseen for periodic review of forthcoming data.

NOTES SPECIFIC TO TABLE 1:

1.) In Ontario, the enabling legislation for the Point of Impingement Standards is Regulation 308 of the Environmental Protection Act. Regulation 308 should be consulted for application of the Point of Impingement Standards. Desirable Ambient Air Quality Criteria are defined by Regulation 296 under the Environmental Protection Act.

2.) When the 'Status' column is given as 'CARC' (ie. CARCINOGEN), it is implied that there is no assigned standard or interim standard. Further, emissions to the environment are to be prevented or limited to the greatest extent possible.

3.) D/F - The notation 'D/F' indicates that where polychlorinated dibenzodioxins (PCDD's) are emitted in mixtures with polychlorinated dibenzofurans (PCDF's), the following relationships must be satisfied:

$$(A/450) + (B/22500) \leq 1 \qquad \text{AND} \quad (C/30) + (D/1500) \leq 1$$

where A = PCDD concentration in air for 1/2 hr averaging time
B = PCDF concentration in air for 1/2 hr averaging time
C = PCDD concentration in air for annual averaging time
D = PCDF concentration in air for annual averaging time
and all of A, B, C and D are in units of pg/m^3 (picograms per cubic metre).

4.) In the 'AAQC Limiting Effect' column (ie. Table 1) when entries are separated by a semi-colon (eg. odour;irritant;odour for the contaminant butanol, n-) then these apply consecutively to the numbers in that row (ie. to 770, 15000 and 3100 respectively); entries separated by '&' or a '/' generally apply to a single number which protects against both effects listed.

5.) Ozone depleting substances are those substances governed by Part V-A of the Environmental Protection Act (amended June 20, 1989) and regulations under the Act. All chlorofluorocarbons (CFC's) affected by these amendments are referenced in the list of AAQCs as "Part V-A/EPA" and are included for information purposes.

6.) Industry specific trade name associated interim standards (eg. Solvesso 100, Cyclosol 63) have been removed from our listings. We are presently addressing this issue through the development of composition specific interim standards for several 'representative' hydrocarbon mixtures. A common name will be selected for these mixtures and they will appear in the standard list under this name. This should lead to a more consistent approach to the evaluation of all similar trade solvents and to allow us to effect much greater regulatory control for many trade name mixtures that would have escaped regulatory control had we continued with the use of specific trade names.

7.) For Silica the three most significant forms have been specified and identified by their CAS # s. There has been no change in the value of the Interim Standard.

8.) Revisions to previous limits or ASLs recently developed have been identified with the 'NEW' designation in the first column of Table 1.

9.) 23 new ASLs have been added this year to the list bringing the total number of ASLs to 35.

Table 1: Ambient Air ity Criteria and Point of Impingement Limits Air Contaminants.

Date: Jul-92

	Contaminant Name	Contaminant Code or CAS No.	Point of Impingement Standard: Half Hour Point of Impingement Limit (ug/m3)	Point of Impingement Standard: Point of Impingement Limiting Effect	Point of Impingement Standard: Status	Ambient Air Quality Criteria (AAQC): Annual (ug/m3)	Ambient Air Quality Criteria (AAQC): 24 Hour (ug/m3)	Ambient Air Quality Criteria (AAQC): One Hour (ug/m3)	Ambient Air Quality Criteria (AAQC): 10 Minute (ug/m3)	Ambient Air Quality Criteria (AAQC): AAQC Limiting Effect
	Acetic acid	64-19-7	2500	Odour	S		2500			Odour
	Acetone	67-64-1	48000	Odour	S		48000			Odour
	Acetophenone	98-86-2	625	Odour	IS			1167	850	Health & Odour
	Acetylene	74-86-2	56000	Odour	S		56000			Odour
	Acrolein	107-02-8	28	Health	IS		23.5			Health
	Acrylamide	79-06-1	45	Health	S		15			Health
	Acrylonitrile	107-13-1	300	Health	IS		100			Health
	Adipic acid	124-04-9	3500	Health	ASL		1167			Health
	Alkyltoluene sulphonamide, n-	N/A	100		IS		120			Particulate
	Allyl glycidyl ether	106-92-3	180	Health	ASL		60			Health
NEW	Aluminum distearate	300-92-5	100	Health	ASL		2180			Particulate
	Aluminum oxide	1344-28-1	100		IS		120			Particulate
NEW	Aluminum stearate	7047-84-9	100	Health	ASL		2180			Particulate
NEW	Aluminum tristearate	637-12-7	100	Health	ASL		2180			Particulate
	Ammonia	7664-41-7	3600	Odour	S		3600			Odour
	Ammonium chloride	12125-02-9	100		IS		120			Particulate
	Amyl acetate, iso-	128-92-8					53200			Health & Odour
	Amyl acetate, n-	628-63-7					53200			Health & Odour
	Amyl acetate, secondary	626-38-0					66500			Health & Odour
	Antimony and compounds	7440-36-0	75	Health	S		25			Health
	Arsenic and compounds	7440-38-2	1	Health	IS		0.3			A Health
	Arsine	7784-42-1	10	Health	S		5			Health
	Asbestos (fibers > 5 um in length)	1332-21-4					0.04	fibers/cm3		Health
	Asbestos (total)	1332-21-4	5	Health	IS					
	Barium - total water soluble	7440-39-3	30	Health	IS		10			Health
	Benzene	71-43-2			CARC					Health
	Benzo(a)pyrene - single source	50-32-8	0.0033	Health	IS	0.00022	0.0011			Health
	Benzo(a)pyrene, all sources	50-32-8				0.0003				Health
NEW	Benzoic acid	65-85-0	2100	Health	ASL		700			Health
	Benzothiazole	95-16-9	200	Health	IS		70			Health
	Benzoyl chloride	98-88-4	350	Health	IS		125			Corrosion&Health
	Benzyl alcohol	100-51-6	2640	Health	ASL		880			Health
	Beryllium and compounds	7440-41-7	0.03	Health	S		0.01			Health
	Biphenyl	92-52-4	60	Odour	IS			60		Odour
	Borax	1303-96-4	100	Health	IS		33			Health
	Boric acid	10043-35-3	100	Health	IS		33			Health
	Boron	7440-42-8	100		S		120			Particulate
	Boron tribromide	10294-33-4	100	Corrosion	S		35			Corrosion
	Boron trichloride	10294-34-5	100	Corrosion	S		35			Corrosion
	Boron trifluoride	7637-07-2	5		S		2			Vegetation
	Bromacil	314-40-9	30	Health	IS		10			Health
	Bromine	7726-95-6	70	Health	S		20			Health
	Bromochlorodifluoromethane (Halon 1211)	N/A	see	"Part V-A/EPA"						Ozone depleting

TERMS:
carbon monoxide -8 hour average based on high background levels from automobiles.
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+ arithmetic mean ++ geometric mean
S = Air Quality Standard, IS= Interim Standard, ASL= Approvals' Screening Lev
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under the Environmental Protection Act.

ARB:

Table 1: Ambient Air Quality Criteria and Point of Impingement Limits for Air Contaminants.

Date: Jul-92

Contaminant Name	Contaminant Code or CAS No.	Point of Impingement Standard: Half Hour Point of Impingement Limit (ug/m3)	Point of Impingement Standard: Point of Impingement Limiting Effect	Status	Ambient Air Quality Criteria (AAQC): Annual (ug/m3)	24 Hour (ug/m3)	One Hour (ug/m3)	10 Minute (ug/m3)	AAQC Limiting Effect
Bromoform	75-25-2	165	Health	ASL		55			Health
Bromotrifluoromethane (Halon 1301)	75-63-8	see	"Part V-A/EPA"						Ozone depleting
Butanol, iso-	78-83-1	1940	Odour	IS		655	15000	2640	Odour;Health;Odour
Butanol, n-	71-36-3	2278	Odour	IS		770	15000	3100	Odour;Irr;Odour
Butanol, tertiary	75-65-0			UD		30300			Health
Butoxy-2-propanol,1-	5131-66-8	9900	Health	ASL		3300			Health
Butyl acetate, n-	123-86-4	735	Odour	IS		248	15000	1000	Odour;Health;Odour
Butyl acrylate	141-32-2	100		IS		120			Particulate
NEW Butyl benzene sulphonamide, n-	3622-84-2	105	Health	ASL		35			Health
NEW Butyl benzyl phthalate	85-68-7	450	Health	ASL		150			Health
Butyl stearate	123-95-5	100		IS		120			Particulate
Cadmium and compounds	7440-43-9	5	Health	S		2			A Health
Calcium carbide	75-20-7	20	Corrosion	IS		10			Corrosion
Calcium cyanide (as total salt)	592-01-8	100		IS		120			Particulate
Calcium hydroxide	1305-62-0	27	Corrosion	S		13.5			Corrosion
Calcium oxide	1305-78-8	20	Corrosion	S		10			Corrosion
NEW Calcium stearate	1592-23-0	100	Health	ASL		35.0			Particulate
Captan	133-06-2	75	Health	IS		25			Health
Carbon black	1333-86-4	25	Soiling	S		10			Soiling
Carbon disulphide	75-15-0	330	Odour	S		330			Odour
Carbon monoxide	630-08-0	6000	Health	S		15700 (8 hour ave)	36200		A **see note below
Carbon tetrachloride	56-23-5	1800	Health	IS		600			Health
Chloramben	133-90-4	100		IS		120			Particulate
Chlordane	57-74-9	15	Health	IS		5			Health
Chlorinated dibenzo-p-dioxins (CDDs) ** D/F	N/A	0.00045	Health	IS	0.00003				Health
Chlorine	7782-50-5	300	Health	S		150			Health&Vegetation
Chlorine dioxide	10049-04-4	85	Health	S		30			Health
Chlorodifluoromethane (Freon 22)	75-45-6	1050000	Health	IS		350000			Health
Chloroform	67-66-3	1500	Health	IS		500			Health
Chloropentafluoroethane (CFC-115)	76-15-3	see	"Part V-A/EPA"						Ozone depleting
Chromium - di-, tri- and hexavalent forms	7440-47-3	5	Health	IS		1.5			Health
Citric acid	77-92-9	100	Particulate	IS		120	300		Health&Particulate
Coal tar pitch volatiles - soluble fraction	8007-45-2	3	Health	IS	0.2	1			Health
Cobalt	7440-48-4	0.3	Health	IS		0.1			Health
Copper	7440-50-8	100	Health	S		50			Health
Cresols	1319-77-3	230	Health	S		75			Health
Cyanogen chloride	506-77-4	15	Health	IS		12			Health
Cyclohexane	110-82-7	300000	Health	IS		100000			Health
Dalapon sodium salt	127-20-8	100	Health	IS		50			Health
Decaborane	17702-41-9	50	Health	S		25			Health
Decane, n-	124-18-5			UD			60000		Health & Odour
Decene, 1-	872-05-9	180000	Health	IS		60000			Health

TERMS:
carbon monoxide -8 hour average based on high background levels from automobiles.
* average monthly results for growing season.
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+ arithmetic mean ++ geometric mean
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Table 1: Ambient Air Quality Criteria and Point of Impingement Limits for Air Contaminants.

Date: Jul-92

	Contaminant Name	Contaminant Code or CAS No.	Point of Impingement Standard: Half Hour Point of Impingement Limit (ug/m3)	Point of Impingement Standard: Point of Impingement Limiting Effect	Status	Ambient Air Quality Criteria (AAQC): Annual (ug/m3)	24 Hour (ug/m3)	One Hour (ug/m3)	10 Minute (ug/m3)	AAQC Limiting Effect
	Dodine	24391-00-3	30	Health	IS		10			Health
	Droperidol	548-73-2	3	Health	IS		1			Health
	Dustfall	N/A	8000 (ug/m2)	Soiling	S	4.6 g/m2 + (annual)	7 g/m2 (30 day)			A Soiling
	Ethanol (Ethyl alcohol)	64-17-5	19000	Odour	IS			19000		Odour
	Ethyl acetate	141-78-6	19000	Odour	S			19000		Odour
	Ethyl acrylate	140-88-5	4.5	Odour	S			4.5		Odour
	Ethyl benzene	100-41-4	4000	Odour	S			4000		Odour
	Ethyl ether	60-29-7	30000	Odour	IS		30000			Odour & Health
	Ethyl hexanol, 2-	104-76-7	600	Odour	IS			600		Odour
	Ethyl-3-ethoxy propionate	763-69-9	147	Odour	IS		50		200	Odour
	Ethylanthraquinone, 2-	84-51-5	30	Health	IS		10			Health
NEW	Ethylene	74-85-1			UD		40			Vegetation
NEW	Ethylene dibromide	106-93-4	9	Health	ASL		3			Health
	Ethylene dichloride	107-06-2	1200	Health	IS		400			Health
	Ethylene glycol	107-21-1					12700			Health
	Ethylene glycol butyl ether (Butyl cellosolve)	111-76-2	350	Odour	IS		2400		500	Health;Odour
	Ethylene glycol butyl ether acetate (But.cell.ace)	112-07-2	500	Odour	IS		3250		700	Health;Odour
	Ethylene glycol dinitrate	628-96-6	10	Health	IS		3			Health
	Ethylene glycol ethyl ether (Cellosolve)	110-80-5	800	Odour	IS		380		1100	Health;Odour
	Ethylene glycol ethyl ether acetate (Cell. ace.)	111-15-9	220	Odour	IS		540		300	Health;Odour
	Ethylene glycol monohexyl ether	112-25-4					2500			Health
	Ethylene oxide	75-21-8	15	Health	IS		5			Health
	Ethylenediaminetetra acetic acid	60-00-4	100		IS		120			Particulate
	Fentanyl citrate	990-73-8	0.06	Health	IS		0.02			Health
	Ferric oxide	1309-37-1	75	Soiling	S		25			Soiling
	Fluoridation - as total fluorides, total GS	7664-39-3				40 ug/100 cm2 /30 day				A Vegetation
	Fluoridation - as total fluorides, total NGS	7664-39-3				80 ug/100 cm2 /30 day				A Vegetation
	Fluorides (as HF) - gaseous - growing season GS	7664-39-3				0.34 ug/m3/30 day				A Vegetation
	Fluorides (as HF) - gaseous - growing season GS	7664-39-3	4.3	Vegetation	S		0.86			A Vegetation
	Fluorides (as HF) - total, growing season GS	7664-39-3	8.6	Vegetation	S		1.72			A Vegetation
	Fluorides (as HF) - total, growing season GS	7664-39-3				0.69 ug/m3/30 day				A Vegetation
	Fluorides (as HF) - total, non-growing season NGS	7664-39-3	17.2	Vegetation	S		3.44			A Vegetation
	Fluorides (as HF) - total, non-growing season NGS	7664-39-3				1.38 ug/m3 / 30 day				A Vegetation
	Fluorides in dry forage-dry weight	7664-39-3				35 ppm/30 day ave.*				A Effects on Animals
						80 ppm/30 day ave.**				A Effects on Animals
						60 ppm/60 day ave.***				A Effects on Animals
	Fluorinert 3M-FC-70	N/A	100		IS		120			Particulate
	Fluorotrichloromethane (CFC-11)	75-69-4	see	"Part V-A/EPA"						Ozone depleting
	Formaldehyde	50-00-0	65	Odour	S			65		Odour

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	Contaminant Name	Contaminant Code or CAS No.	Point of Impingement Standard: Half Hour Point of Impingement Limit (ug/m3)	Point of Impingement Standard: Point of Impingement Limiting Effect	Point of Impingement Standard: Status	Ambient Air Quality Criteria (AAQC): Annual (ug/m3)	24 Hour (ug/m3)	One Hour (ug/m3)	10 Minute (ug/m3)	AAQC Limiting Effect
	Formic acid	64-18-6	1500	Health	S		500			Health
	Furfural	98-01-1	1000	Odour	S			1000		Odour
	Furfuryl alcohol	98-00-0	3000	Health	S		1000			Health
	Gasoline	8006-61-9			UD					Odour
	Glutaraldehyde	111-30-8	42	Health	IS		14	35		Health
	Haloperidol	52-86-8	0.3	Health	IS		0.1			Health
	Hexachlorocyclopentadiene	77-47-4	6	Health	IS		2			Health
	Hexamethyl disilazane	999-97-3	5	Health	IS		2			Health
	Hexamethylene diisocyanate monomer	822-06-0	1.5	Health	IS		0.5			Health
	Hexamethylene diisocyanate trimer	4035-89-6	3	Health	IS		1			Health
NEW	Hexamethylenediamine	124-09-4	48.0	Health	ASL		16.0			Health
NEW	Hexamethyleneimine	111-49-9	945	Health	ASL		315			Health
	Hexane	110-54-3	35000	Health	IS		12000			Health
	Hexylene glycol	107-41-5	14400	Health	IS			12000		Health & Irrit.
	Hydrogen bromide	10035-10-6	800	Health	IS			668		Health
	Hydrogen chloride	7647-01-0	100	Corrosion	S		40			Corrosion
	Hydrogen cyanide	74-90-8	1150	Health	S		575			Health
	Hydrogen peroxide	7722-84-1	90	Health	IS		30			Health
	Hydrogen sulphide	7783-06-4	30	Odour	S			30		A Odour
	Iron - metallic	15438-31-0	10	Soiling	S		4			Soiling
	Isobutyl acetate	110-19-0	1220	Odour	IS		412		1660	Odour;Odour
	Isopropyl ether	108-20-3	220	Odour	ASL		110000			Health
	Isopropyl acetate	108-21-4	1470	Odour	IS		500		2000	Odour;Odour
	Isopropyl benzene	98-82-8	100	Odour	IS			100		Odour
	Lead	7439-92-1	10	Health	S					
						3 ug/m3 / 30 day +				Health
						2 ug/m3 / 30 day++				A Health
	Lead - single sample	7439-92-1					5			A Health
	Lead in dustfall	7439-92-1				0.1 g/m2 / 30 day				Health
	Lindane (Hexachlorocyclohexane)	58-89-9	15	Health	IS		5			Health
	Lithium - other than hydrides	7439-93-2	60	Health	S		20			Health
	Lithium hydrides	7580-67-8	7.5	Health	S		2.5			Health
	Magnesium oxide	1309-48-4	100		S		120			Particulate
NEW	Magnesium stearate	557-04-0	100	Health	ASL		35.0			Particulate
	Malathion	121-75-5	100		IS		120			Particulate
	Maleic anhydride	108-31-6	100	Health	IS		30			Health
	Manganese compounds (including permanganates)	7439-96-5	7.5	Health	IS		2.5			Health
	Mercaptans (as Methyl mercaptan) - total	74-93-1	20	Odour	S			20		A Odour
	Mercaptobenzothiazole disulphide	120-78-5	100		IS		120			Particulate
	Mercury	7439-97-6	5	Health	S		2			A Health
	Mercury (as Hg) - alkyl compounds	7439-97-6	1.5	Health	S		0.5			Health
	Metaldehyde (Acetaldehyde tetramer)	108-62-3	100		IS		120			Particulate
	Methacrylic acid	79-41-4	2000	Odour	IS		2000			Odour

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Table 1: Ambient Air Quality Criteria and Point of Impingement Limits for Air Contaminants.

	Contaminant Name	Contaminant Code or CAS No.	Point of Impingement Standard: Half Hour Point of Impingement Limit (ug/m3)	Point of Impingement Standard: Point of Impingement Limiting Effect	Point of Impingement Standard: Status	Ambient Air Quality Criteria (AAQC): Annual (ug/m3)	24 Hour (ug/m3)	One Hour (ug/m3)	10 Minute (ug/m3)	AAQC Limiting Effect
	Methane diphenyl diisocyanate	101-68-8	3	Health	IS		1			Health
	Methanol (Methyl alcohol, Wood alcohol)	67-56-1	84000	Health	S		28000			Health
	Methoxy-1-propyl acetate, 2-	70657-70-4	4600	Health	ASL		1530			Health
	Methoxychlor	72-43-5	100		IS		120			Particulate
	Methyl acrylate	96-33-3	4	Odour	S			4		Odour
	Methyl bromide	74-83-9	4000	Health	IS		1350			Health
	Methyl chloride	74-87-3	20000	Health	IS		7000			Health
	Methyl ethyl ketone (2-Butanone)	78-93-3	31000	Odour	S			31000		Odour
	Methyl ethyl ketone peroxide	1338-23-4	250	Health	IS		80	200		Health;Health
	Methyl isobutyl ketone	108-10-1	1200	Odour	IS		1200			Odour
	Methyl mercapto aniline	2987-53-3			UD					Odour
	Methyl methacrylate	80-62-6	860	Odour	S		860			Odour
	Methyl salicylate	119-36-8	300	Health	IS		100			Health
	Methyl styrene, alpha	98-83-9			UD			24000		Health
NEW	Methyl tert-butyl ether	1634-04-4	2200	Odour	ASL		7000			Health
	Methyl-2-hexanone, 5-	110-12-3	460	Odour	IS		160		630	Odour
	Methyl-2-pyrrolidone, n-	872-50-4						40000		Health
	Methyl-n-amyl ketone	110-43-0			UD		4600			Health
	Methylal	109-87-5	18000	Health	IS		6200			Health
	Methylcyclopentadienyl manganese tricarbonyl (MMT)	12108-13-3	30	Health	IS		10			Health
	Methylene chloride	75-09-2	5300	Health	IS		1765			Health
	Methylene dianiline	101-77-9	30	Health	IS		10			Health
	Methylene iodide	75-11-6	195	Health	ASL		65			Health
	Methylene-bis-2-chloroaniline, 4,4-	101-14-4	30	Health	IS		10			Health
	Miconazole nitrate	22832-87-7	15	Health	IS		5			Health
	Milk powder	N/A	20	Soiling	S		20			Soiling & Odour
	Mineral Spirits	N/A	30,000	Odour	IS		10,000			Health
	Molybdenum	7439-98-7	100		IS		120			Particulate
	Monochlorobenzene	108-90-7	4200	Health	IS			3500	4500	Health;Odour
	Monomethyl amine	74-89-5	25	Odour	S		25			Odour
	Naphthalene	91-20-3	36	Odour	IS		22.5		50	Health;Odour
	Naphthol, alpha-	90-15-3	100	Health	IS		100			Health
	Nickel	7440-02-0	5	Vegetation	S		2			A Vegetation
	Nickel carbonyl	13463-39-3	1.5	Health	S		0.5			Health
	Nitric acid	7697-37-2	100	Corrosion	S		35			Corrosion
	Nitrilotriacetic acid	139-13-9	100		S		120			Particulate
	Nitrogen oxides (as Nitrogen dioxide)	10102-44-0	500	Health	S		200	400		A Health;Health
	Nitroglycerin	55-63-0	10	Health	IS		3			Health
	Nitrosodiethylamine, n-	55-18-5			CARC					Health
	Nitrosodimethylamine, n-	62-75-9			CARC					Health
	Nitrous oxide	10024-97-2	27000	Health	IS		9000			Health
	Octane	111-65-9	45400	Odour	IS		15300		61800	Odour;Odour
	Octene, 1-	25377-83-7	150000	Health	IS		50000			Health

TERMS:
carbon monoxide -8 hour average based on high background levels from automobiles.
* average monthly results for growing season.
** average results of any single month.
*** average of 2 consecutive months.
GS -Growing Season May 1 - September 30 - Northern Ontario, NE & NW Regions.
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D/F= dioxins & furans, see notes preceeding Table 1.
A = AAQC chemicals listed in Regulation 296.
under the Environmental Protection Act.

Table 1: Ambient Air Quality Criteria and Point of Impingement Limits for Air Contaminants.

	Contaminant Name	Contaminant Code or CAS No.	Point of Impingement Standard: Half Hour Point of Impingement Limit (ug/m3)	Point of Impingement Standard: Point of Impingement Limiting Effect	Point of Impingement Standard: Status	Ambient Air Quality Criteria (AAQC): Annual (ug/m3)	Ambient Air Quality Criteria (AAQC): 24 Hour (ug/m3)	Ambient Air Quality Criteria (AAQC): One Hour (ug/m3)	Ambient Air Quality Criteria (AAQC): 10 Minute (ug/m3)	Ambient Air Quality Criteria (AAQC): AAQC Limiting Effect
	Oleic acid	112-80-1	6	Health	IS			5		Health
	Oxalic acid	144-62-7	75	Health	IS		25			Health
	Oxo-heptyl acetate	90438-97-2	255	Odour	ASL		85			Health
	Oxo-hexyl acetate	88230-35-7	255	Odour	ASL		85			Health
	Ozone	10028-15-6	200	Health	$			165		A Health&Vegetation
	Palladium - water soluble compounds	7657-10-1	30	Health	IS		10			Health
	Paraquat dichloride - respirable	1910-42-5	0.009	Health	IS		0.003			Health
	Paraquat dichloride - total in ambient air	1910-42-5	0.045	Health	IS		0.015			Health
	Penicillin	1406-05-9	0.3	Health	IS		0.1			Health
	Pentaborane	19624-22-7	3	Health	$		1			Health
	Pentachlorophenol	87-86-5	60	Health	IS		20			Health
	Perchloroethylene	127-18-4	10000	Health	IS		4000			Health
	Phenol	108-95-2	100	Health	$		100			Health
	Phosgene	75-44-5	130	Health	$		45			Health
	Phosphine	7803-51-2	30	Health	IS		10			Health
	Phosphoric acid (as P2O5)	7664-38-2	100		$		120			Particulate
	Phosphorus oxychloride	10025-87-3	40	Health	IS		12			Health
	Phosphorus pentachloride	10026-13-8	30	Health	IS		10			Health
	Phthalic anhydride	85-44-9	100		$		120			Particulate
	Pimozide	2062-78-4	3	Health	IS		1			Health
	Platinum - water soluble compounds	7440-06-4	0.6	Health	IS		0.2			Health
	Polybutene-1-sulphone	N/A	100		IS		120			Particulate
	Polychlorinated biphenyls (PCBs)	1336-36-3	0.45	Health	IS	0.035	0.15			Health
	Polychloroprene	25267-15-6	100		IS		500			Particulate
	Potassium cyanide	151-50-8	100		IS		120			Particulate
	Potassium hydroxide	1310-58-3	28	Corrosion	IS		14			Corrosion
	Potassium nitrate	7757-79-1	100		IS		120			Particulate
	Propanol, iso- (Isopropyl alcohol, Isopropanol)	67-63-0	24000	Odour	IS		24000			Odour
	Propanol, n- (Propyl alcohol)	71-23-8	48000	Health	IS		16000			Health
	Propionaldehyde	123-38-6	7	Odour	IS		2.5		10	Odour;Odour
	Propionic acid	79-09-4	100	Odour	IS			100		Odour;Odour
	Propionic anhydride (as Propionic acid)	123-62-6	100	Odour	IS			100		Odour
NEW	Propyl acetate, n-	109-60-4	900	Odour	ASL		6600			Health
	Propylene dichloride	78-87-5	2400	Odour	$		2400			Odour
	Propylene glycol	57-55-6	100	Health	IS		120			Health
	Propylene glycol methyl ether	107-98-2	89000	Odour	IS		30000		121000	Odour;Odour
	Propylene glycol monomethyl ether acetate	108-65-6	5000	Odour	IS		5000			Odour
	Propylene oxide	75-56-9	13500	Health	IS		4500			Health
	Pyridine	110-86-1	60	Odour	IS		150		80	Health;Odour
NEW	Quinone	106-51-4	45	Health	ASL		15			Health
	Selenium	7782-49-2	20	Health	IS		10			Health
	Silane	7803-62-5	450	Health	IS		150			Health
NEW	Silica -respirable (<10 um diameter), cristabolite	14464-46-1	15	Health	IS		5			Health

TERMS:
carbon monoxide -8 hour average based on high background levels from automobiles.
* average monthly results for growing season.
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ARB:JN

Table 1: Ambient Air Quality Criteria and Point of Impingement Limits for Contaminants.

	Contaminant Name	Contaminant Code or CAS No.	Point of Impingement Standard: Half Hour Point of Impingement Limit (ug/m3)	Point of Impingement Standard: Point of Impingement Limiting Effect	Point of Impingement Standard: Status	Ambient Air Quality Criteria (AAQC): Annual (ug/m3)	Ambient Air Quality Criteria (AAQC): 24 Hour (ug/m3)	Ambient Air Quality Criteria (AAQC): One Hour (ug/m3)	Ambient Air Quality Criteria (AAQC): 10 Minute (ug/m3)	AAQC Limiting Effect
NEW	Silica -respirable (<10 um diameter), quartz	14808-60-7	15	Health	IS		5			Health
NEW	Silica -respirable (<10 um diameter), tridymite	15468-32-3	15	Health	IS		5			Health
	Silver	7440-22-4	3	Health	S		1			Health
	Sodium bisulphite	7631-90-5	100		IS		120			Particulate
	Sodium chlorate	7775-09-9	18	Health	IS		6			Health
	Sodium chlorite	7758-19-2	60	Health	IS		20			Health
	Sodium cyanide	143-33-9	100		IS		120			Particulate
	Sodium hydroxide	1310-73-2	20	Corrosion	IS		10			Corrosion
NEW	Sodium nitrate	7631-99-4	100	Particulate	ASL		7000			Health
	Stannous chloride (as Sn)	7772-99-8	30	Health	IS		10			Health
	Strontium	7440-24-6	100		IS		120			Particulate
	Strontium carbonate	1633-05-2	100		IS		120			Particulate
	Strontium hydroxide	18480-07-4	100		IS		120			Particulate
	Strontium oxide	1314-11-0	100		IS		120			Particulate
	Styrene	100-42-5	400	Odour	S		400			Odour
	Sulphamic acid	5329-14-6	100		IS		120			Particulate
	Sulphur dioxide	7446-09-5	830	Health	S	55	275	690		A Health&Vegetation
	Sulphur hexafluoride	2551-62-4	1800000	Health	IS		600000			Health
	Sulphuric acid	7664-93-9	100	Corrosion	S		35			Corrosion
	Suspended particulate matter < 44 um aero. diam.	N/A	100	Visibility	S	60 ++	120			A Visibility
	Talc - fibrous	14807-96-6	5	Health	IS		2			Health
	Tellurium - excluding hydrogen telluride	13494-80-9	30	Health	S		10			Health
	Tetrabutylurea	4559-86-8	30	Health	IS		10			Health
	Tetrahydrofuran	109-99-9	93000	Odour	S		93000			Odour
	Tetramethyl thiuram disulphide	137-26-8	30	Health	IS		10			Health
	Thiourea	62-56-6	60	Health	IS		20			Health
	Tin	7440-31-5	30	Health	S		10			Health
	Titanium	7440-32-6	100		S		120			Particulate
NEW	Titanium dioxide	13463-67-7	100	Health	ASL		34			Health
	Tolmetin sodium	35711-34-3	15	Health	IS		5			Health
	Toluene	108-88-3	2000	Odour	S		2000			Odour
	Toluene diisocyanate	584-84-9	1	Health	S		0.5			Health
	Total reduced sulphur (as Hydrogen sulphide)	N/A	40	Odour	IS			40		Odour
NEW	Tributyltin oxide	56-35-9	0.42	Health	ASL		0.14			Health
	Trichlorobenzene, 1,2,4-	120-82-1	100		IS		400			Irr;Health
	Trichloroethane, 1,1,1- (Methyl chloroform)	71-55-6	350000	Health	S		115000			Health
	Trichloroethylene	79-01-6	85000	Health	S		28000			Health
	Trichlorofluoromethane	75-69-4	18000	Health	IS		6000			Health
NEW	Trifluoroacetic acid	76-05-1	45	Health	ASL		15			Health
	Trifluorotrichloroethane	76-13-1	2400000	Health	S		800000			Health
	Trimethyl amine	75-50-3	0.5	Odour	IS			see "Part V-A/EPA"		Health
	Trimethylbenzene, 1,2,4-	95-63-6	500	Odour	IS			0.5		Odour
	Trimethylol propane	77-99-6	100	Health	IS		1000			Odour & Health
							1250			Health

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ARB:JN

Table 1: Ambient Air Quality Criteria and Point of Impingement Limits for Air Contaminants.

Date: Jul-92

Contaminant Name	Contaminant Code or CAS No.	Point of Impingement Standard: Half Hour Point of Impingement Limit (ug/m3)	Point of Impingement Standard: Point of Impingement Limiting Effect	Status	Ambient Air Quality Criteria (AAQC): Annual (ug/m3)	24 Hour (ug/m3)	One Hour (ug/m3)	10 Minute (ug/m3)	AAQC Limiting Effect
Tripropyltin methacrylate	N/A	3	Health	IS		1			Health
Vanadium	7440-62-2	5	Health	S		2			A Health
Vinyl chloride	75-01-4	3	Health	IS	0.2	1			Health
Vinylidene chloride (1,1-Dichloroethene)	75-35-4	70	Health	IS		35			Health
Warfarin	81-81-2	30	Health	IS		10			Health
Whey powder	N/A	100		IS		120			Particulate
Xylenes	1330-20-7	2300	Odour	S		2300			Odour
Zinc	7440-66-6	100		S		120			Particulate
Zinc chloride	7646-85-7	12	Health	IS		10			Health
EW Zinc stearate	557-05-1	100	Health	ASL		35.0			Particulate

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ARB:JN

APPENDIX B

LIST OF STANDARDS AND INTERIM STANDARDS IDENTIFIED AS RECOGNIZED AND PROBABLE HUMAN CARCINOGENS

TABLE B-1

Standards

Chemical Cas #	LE	AAQC (24h) ug/m3	/year ug/m3	Date of proposal	IARC	EPA	RsC ug/m3	Time years	AAQC/RsC	Cl	Comments
Acrylamide 79-06-1	H/NC	15		1972	2B	B2	0.008 EPA CA	20	1875	B	AAQC not based on carcinogenesis. Substantial difference between AAQC and RsC
Antimony + Comp. 7440-36-0	H/NC	25		1975	?	?	NA	17		B	No relevant rationale was provided and AAQC was 1/20 the 1975 TLV. Not classified by the EPA and IARC. NYSDEC has an AGC of 1.2 ug/m3 based on non-cancer health effects. However, ACGIH states that the industrial process of Sb trioxide production is listed as a Suspect Human Carcinogen with no TLV. It has been demonstrated to be a carcinogen in animals and a mutagen. Calabrese derived an RsC of 0.0003 ug/m3 (1/100,000 risk)
Beryllium + Comp. 7440-41-7	H/NC	0.01		1975	2A	B2	0.004	17	2.5	C	AAQC was 1/200 the TLV. Based on pulmonary effects. AAQC corresponds to an excess lifetime cancer risk of 2.5/100,000. Although the AAQC and RsC are comparable, a new rationale based on more recent information is mandatory for this probable human carcinogen
Cadmium + Comp. 7440-43-9	H/NC	2		1974	2A	B1	0.006 EPA 0.002 CA	18	333 EPA 1000 CA	B	AAQC was 1/100 of the TLV for dust set to prevent bioaccumulation of Cd and the ensuing nephrotoxicity

Chemical Cas #	LE	AAQC (24h) ug/m3	/year ug/m3	Date of proposal	IARC	EPA	RsC ug/m3	Time years	AAQC/RsC	Cl	Comments
Ethyl Acrylate 140-88-5	O	2.1 odour 4.5 (1h)		1979	2B	B2	CA has a RfC of 48 ug/m3 MASS has a RfC of 0.28 ug/m3	13	-	C	Under review by the US EPA. Evidence of mutagenicity is limited (IARC). Conflicting results between lifetime gavage (CARC) and inhalation (non-CARC) studies in rodents
Formaldehyde 50-00-0	O	65 (1h)		1974	2A	B1	0.8 EPA 0.77 CA	18	-	B	Significant differences in end-points and permissible exposure values; should be reassessed for carcinogenesis
Lead 7439-92-1	H/NC	5(24 h) 3(30 d)		1974	2B	B2	NA	18	-	D	Presently under review by a HCB expert panel. EPA recomends that Pb should not be regulated as a carcinogen
Nickel 7440-02-0	V/NC	2		Early 70's ?	1	A	.02-.04 EPA .038 CA	≈ 18	50-100 EPA 52 CA	B	No rationale was provided for Ni. 24 h AAQC value was based on effects on vegetation. EPA and CA unit risk factors were based on 4 different epidemiological studies demonstrating significant nasal and pulmonary tumor incidences in workers
Nickel-Carbonyl 13463-39-3	H/C	0.5		1974	-	B2	0.04 EPA	18	12.5	C	AAQC was 1/14 of the TLV with consideration being given to carcinogenesis. No RsC/RsD value is proposed by the EPA due to the inadequacy of the available studies. As Ni carbonyl is often assessed as Ni in the "Ni compounds" class the RsC value used for comparison purposes is the upper end value of the EPA RsC range for Ni. Due to the paucity of data on Ni carbonyl and to the relatively low AAQC/RsC ratio, it is recommended that this chemical be reviewed and up-dated in light of the available information on Ni

Chemical Cas #	LE	AAQC (24h) ug/m3	/year ug/m3	Date of proposal	IARC	EPA	RsC ug/m3	Time years	AAQC/RsC	Cl	Comments
Nitriloacetic acid 139-13-9	P	120		1974	2B	-	NA	18	-	B	The AAQC was based on total particulate in air. NTA was classified as a possible carcinogen to humans (2B) by IARC in 1990. However, no guidelines are available from the various regulatory agencies. Although the carcinogenicity of NTA is controversial at environmental exposure levels, it should be reassesad for the appropriate health end-point with current information
Styrene 100-42-5	O	400		1975	2B	IP/CA	17.5 CA	17	23 CA	B	the AAQC was based on odour. A carcinogenic risk assessment is currently under review by the US EPA. The unit risk value used to calculate the RsC was tentative as proposed by CA. Calabrese recomends an annual average value of 26 ug/m3 based on carcinogenesis
Trichloroethylene 79-01-6	H/NC	28000		1971	3	IP/CA	5 CA	21	5600	B	The AAQC value was arbitrarily suggested to prevent health effects although these were not specified. A carcinogenic risk assessment is currently under review by the US EPA. Calabrese recomends an annual average value of 0.4 ug/m3 based on carcinogenesis

TABLE B-2

Interim Standards

Chemical Cas #	LE	AAQC (24h) ug/m3	/year ug/m3	Date of proposal	IARC	EPA	RsC ug/m3	Time years	AAQC/RsC	CI	Comments
Acrylonitrile 107-13-1	H/NC	100		1984	2A	B1	0.1 EPA	8	1000	B	Based on an MOL OEL/UF; was not recognized as a carcinogen at that time
Arsenic + Comp. 7440-38-2	H/C	0.3		1984	1	A	0.002 EPA	8	150	C	New epidemiological studies available (IRIS, 1992)
Asbestos 1332-21-4	H/NC	0.04 fibres/cm3 fibres > 5 um		1970; reviewed in 1980	1	A	.00004 f/cc EPA	12/22	1000	B	Based on the 1968 BOHS OEL/10; no discrimination between various forms; 95% prob of ≤ 1% asbestosis (vs mesothelioma /lung cancer); EPA review IP;new data available since 1980
B(a)P 50-32-8	H/C	0.0011	0.00022	1986	2A	B2	0.006 CA	5	0.04	C	The potency factor (PF) derived by EPA was the geometric mean of 4 PF based on 4 different studies (revised in 1992); MOL suggestion was based on only one of these studies at an excess cancer risk of 1/1,000,000
Benzene 71-43-2	H	Under review			1	A	1-0.34 EPA-CA			B	Under review by ARB
Carbon tetrachloride 56-23-5	H/NC	600		1984	2B	B2	0.7 EPA	8	857	B	Based on systemic effects (NOAEL/50); the design and data of the chronic inhal. study used by the OMOE were judged inadequate by EPA for QRA; current available data suggest sufficient evidence of carcinogenicity in various animal species
CDD's/PCDD	H		0.00003		2B	B2				D	Under constant review by an OMOE expert panel
Chloroform 67-66-3	H/NC	500		1979	2B	B2	0.4/EPA 1.9/CA	13	1250/EPA 265/CA	B	The OMOE value was based on systemic effects (an approximate value was divided by an UF); new data available since 1979

Chemical Cas #	LE	AAQC (24h) ug/m3	/year ug/m3	Date of proposal	IARC	EPA	RsC ug/m3	Time years	AAQC/RsC	CI	Comments
Chromium VI 7440-47-3	H/NC	1.5 total Cr		1982	1	A	0.0008 Cr+6 EPA	10	1875	B	No discrimination between Cr+3 (systemic effects) and Cr+6 (human carcinogen); the AAQC was set at 1/30 the MOL OEL
Coal tar volatiles 8007-45-2	H		0.2		1	A				D	Currently under review by an expert panel
Diethylhexylphtalate 117-81-7	H/C	50		1988	2B	B2	4.2 Based on CA Unit Risk of 0.00024 (ug/m3)-1	4	12	C	Good rationale that takes into account the peroxisome proliferating properties and lack of genotoxicity of the chemical; however, although the EPA approach based on the multisage model was rejected, the AAQC should be reviewed for any possible NOAEL value based on the NTP report (the AAQC was calculated with a (TLV/UF) approach)
Dioxane, 1-4 123-91-1	H/NC	3500		1987	2B	B2	1.3 CA	5	2692	B	The AAQC was calculated by dividing an experimental NOEL by an UF of 100. The rationale did not consider all the studies available. Should be reassessed
Ethylene dichloride 107-06-2	H/NC	400		1985	2B	B2	0.4 EPA	7	1000	B	Poor rationale; AAQC based on non-cancer end-point (TLV/100)
Ethylene oxide 75-21-8	H/NC	5		1986	2A	B1 ?	0.11 CA	6	45	B	Rationale for AAQC development was not based on cancerogenesis; several studies (including a NTP report) were published since 1984 and should be reviewed for assessment
Lindane 58-89-9	H/NC	5		1980	2B	?	NA	12	-	B	Assessment required in light of the possible carcinogenicity of HCH isomers including lindane (Calabrese, 1991; ATSDR, 1992; IARC, 1987)

Chemical Cas #	LE	AAQC (24h) ug/m3	/year ug/m3	Date of proposal	IARC	EPA	RsC ug/m3	Time years	AAQC/RsC	Cl	Comments
Methylene chloride 75-09-2	H/NC	1765		1988	2B	B2	20/EPA 10/CA	4	88/EPA 176/CA	C	Good rationale which takes into account ADME and PB-PK concepts in possible mechanisms of carcinogenesis among several species; however, AAQC was Ontario TLV/UF for the prevention of narcosis and COHb formation. A full reassessment is unlikely to be required, although should be reviewed in light of recent Andersen studies
Methylene dianiline 101-77-9	H/C	10		1979	2B	- /CA	0.03 CA	13	333	C	AAQC should be reviewed in light of new info including a NTP report published in 1987 suggesting sufficient evidence of carcinogenicity in animals (6th An Rep Carcino, 1991); CA unit risk is for screening level only
Methylene-bis-2-chloroaniline 101-14-4	H/NC	10		1974	2A	B2?/ CA	0.27 EPA	18	37	B	No rationale provided although it was suspected as a possible animal carcinogen at that time; AAQC was based on detection limit; new studies available since
Perchloroethylene 127-18-4	H/NC	4000		1977	2B	IP/ CA	17.2 CA	15	232	B	Various studies appeared since 1977 including a NTP report in 1986 indicating sufficient evidence of carcinogenicity in animals
PCB's 1336-36-3	H		0.035		2A	B2				D	Under constant review by an OMOE expert panel
Propylene oxide 75-56-9	H/NC	4500		1983	2A	B2	3	8	1500	B	Reassess for carcinogenesis in light of the NTP study (1985) and other reports published since
Cristobalite 14464-46-1	H	5		1979	2A	-	see CA	13		C	See CA HOT SPOT Document
Quartz 14808-60-7	H	5		1979	2A	-	see CA	13		C	See CA HOT SPOT Document
Trudymite 15468-32-3	H	5		1979	2A	-	see CA	13		C	See CA HOT SPOT Document

Chemical Cas #	LE	AAQC (24h) ug/m3	/year ug/m3	Date of proposal	IARC	EPA	RsC ug/m3	Time years	AAQC/RsC	Cl	Comments
Talc-fibrous 148077-96-6	H/NC	2		1975	1	-		17		C	Should be reviewed in conjunction with new studies on asbestos
Thiourea 62-56-6	H/C	20		1986	2B	- /CA	0.018 CA	6	1111	C	RsC is a screening value; should be reviewed for current data
Vinyl chloride 75-01-4	H/C		0.2	1989	1	A	0.21	3	1	C	AAQC was taken as the geometric mean of different studies. Up-date

TABLE B-3

NEW CARCINOGENS IDENTIFIED (WINDSOR STUDY)

Chemical Cas #	LE	AAQC (24h) ug/m3	/year ug/m3	Date of proposal	IARC	EPA	RsC ug/m3	Time years	AAQC/RsD	CI	Comments
Acetaldehyde 75-07-0		NA			2B	B2					
1,3-butadiene 106-99-0		NA			2B	B2					
1,4-dioxane 123-91-1		NA			2B	B2					
Epichlorohydrin 106-89-8		NA			2A	B2					
Ethylene dibomide 106-93-4		NA			2A	B2					
Hexachlorobenzene 118-74-1		NA			2B	B2					
N-nitroso-dimethylamine 62-75-9		NA			2A	B2					
PAH Mixture		NA									
B(a)anthrancene 56-55-3					2A	B2					
B(b)fluoranthene 205-99-2					2B	B2					
B(a)Pyrene 50-32-8					2A	B2					
Dibenz(a,h)anthracene 53-70-3					2A	B2					
Indenol[1,2,3-cd]pyrene 193-39-5					2B	B2					

Chemical Cas #	LE	AAQC (24h) ug/m3	/year ug/m3	Date of proposal	IARC	EPA	RsC ug/m3	Time years	AAQC/RsD	Cl	Comments
Pentachlorophenol 87-86-5		NA			-	B2					
2,4,6-Trichlorophenol 88-06-2		NA			-	B2					
Vinyl bromide 593-60-2		NA			2A	-					

-LE: Limiting effect; H:health; C:cancer; NC: non-cancer; O: odour; V: vegetation; P: particulate
-AAQC: 24h value unless otherwise stated
- /year (in ug/m3)
-IARC classification; 1: carcinogenic to humans; 2A: probably carcinogenic to humans;
2B: possibly carcinogenic to humans
EPA classification; A: carcinogenic to humans; B1/B2: probably carcinogenic to humans (B1 > B2)
?: requires verification; IP: review In Progress; CA: regulated by the State of California
-RsC: Risk Specific Concentration for 1/100,000
-Time: time in years elapsed since proposal
-Cl: requirements for review/assessment/standard setting; A: suggestion is made that interim standard be adopted as a standard; B: substantial reduction and/or reassessment; C: review/up-date; D: unchanged status (for details see text)

Reference to Calabrese: Calabrese, E.J.,and Kenyon, E.M. 1991. Air Toxics and Risk Assessment. Lewis Publisher Inc., Michigan, 662p.

APPENDIX C

LIST OF HEALTH-BASED INTERIM STANDARDS

TABLE C

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[3]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Acrolein 107-02-8	IRR	23.5	1987	0.02 RESP	0.02 RESP			250 RESP		SYS	INHL A	SUB	5	1175[EPA]	YES	B	Although the AAQC was based on a human LOAEL, the uncertainty factor used was judged inadequate (UF=2). Furthermore, the high AAQC/MR ratio (1175) and positive LE/EP ratios as compared to EPA-based value suggest a reassessment
Barium (total water soluble) 7440-39-3	H	10	1978	245[5] CV/BL				500 CV/BL		SYS	ORAL H	CHR	14	0.05[EPA]	YES	D	Exact computation of the AAQC was not specified although it was based on a TLV (NOAEL) of 500 mg/m^3. The AAQC may be overestimated. An EPA expert panel is currently reviewing an RfC for barium and in view of the low AAQC/MR ratio the AAQC should remain unchanged until new info. becomes available
Benzothiazole 95-16-9	?	70	1984								ORAL A		8			C	Based on the available toxicity data on MBT (oral study in rabbits) where the NOEL was divided with an UF of 1000. No regulatory data available. Should be reviewed for new info

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Borax 1303-96-4	IRR	33	1988					1000 IRR		IRR	H	ACU	4	0.33	NO	A	The original proposed AAQC was a 1-hour average value of 88 ug/m^3 set to prevent IRR. The 24h value should not be used to regulate fast-acting, sensory irritants. The rationale and the 1 hour-based AAQC value are judged to be appropriate to address health effects induced by exposure to this compound. The MR value was TWA/10 to take into account sensitive populations
Boric acid 10043-35-3	IRR	33	1988					1000 IRR		IRR	H	ACU	4	0.33	NO	A	The original proposed value was a 1-hour average value of 88 ug/m^3 set to prevent IRR. The 24h value should not be used to regulate fast-acting sensory irritants. The rationale and the 1 hour-based AAQC value are judged to be appropriate to address health effects induced by exposure to this compound. The MR value was TWA/10 to take into account sensitive populations
Bromacil 314-40-9	SYS	10	1978					10,000 IRR		IRR	INHL A	SUB	14	0.4[3]	YES	B	The AAQC computation was not specified although based on animal oral NOAEL for systemic effects

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[3] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Captan 133-06-2	H	25	1986	455[3] REP				5000 GI/LV		SYS	ORAL A	CHR	6	0.06[EPA]	YES	D	AAQC was the TLV/UF while EPA RfC was estimated from the oral RfD. Although AAQC/MR ratio is significantly low (and therefore the AAQC could remain unchanged) toxicity data should be reviewed to address differences in end-points. However, as the Pesticide Advisory Commitee is in the process of producing a document, changes in the current AAQC sgould await further data
Chlordane 57-74-9	GI/L V	5	1984	0.21[3] GI/LV				500 LV		SYS	ORAL A	CHR	8	24[EPA]	NO	C	EPA RfC was estimated by converting oral RfD while the AAQC was derived from the TLV. Same end-points in both cases and relatively low AAQC/MR ratio. Should be up-dated

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Chlorodifluoromethane (Freon 22) 75-45-6	SYS	350 mg	1987			700		3540 mg CNS		SYS	INHL A	CHR	5	42[3]	NO	D	Under review by ACGIH as a 3.5 fold excess incidence of cardiac palpitations were observed in workers. Should remain unchanged until new data become available as a AAQC/MR ratio of 42 may not be waranted based only on TLV/420 as populations are exposed to substantially lower concentrations than workers. Furthermore, based on the Montreal protocol, considerations based on ozone depletion potential will be included in the development of air standards for CFC. A federal-provincial panel is currently working on this issue

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Citric acid 77-92-9	IRR	120	1988							IRR	INHL A	ACU	4			A	No occupational and environmental standards available; very low toxicity; component of endogenous metabolism in mammals; the original proposed value was a 1-hour value of 300 ug/m^3 set to prevent IRR. The 24h value should not be used to address short-term effects such as IRR. The rationale and the 1 hour-based AAQC value are judged to be appropriate to address health effects induced by exposure to this compound
Cobalt 7440-48-4	H	0.1	1988	0.12[2]				50 RESP		?	?	?	4	0.8[NYSDEC]	?	A	TLV based on human NOAEL. AAQC comparable to the NYSDEC value for the pulmonary route. Obtain rationale from NYSDEC
Cyanogen chloride 506-77-4	CV/N S	12	1987					600 CV/NS		SYS	INHL H	SUB	5	8.4[3]	NO	C	The AAQC was based on the TLV/50, however TLV derivation was not specified
Cyclohexane 110-82-7	IRR	100 mg	1975					1000 mg IRR	280	?	?	?	17	357[MA]	?	B	AAQC was derived from the TLV and thus was based on IRR; AAQC greater than MASS value which is most likely based on systemic effects

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[2]	Inh/ Oral H A[1]	Sub/ Chr[3]	T	AAQC/ MR	LE/EP	CI	Comments
Dalapon sodium salt 127-20-8	SYS	50	1987							SYS	ORAL A	CHR	5			D	Should be reviewed, however due to the lack of regulatory information it is expected that the AAQC will remain unchanged
Decene, 1- 872-05-9	H	60 mg	1982							?	?	?	6		?	D	Should be reviewed as no rationale for AAQC development was provided; however due to the lack of regulatory and scientific info. it is expected that the AAQC will remain unchanged. QSAR with decane and other aliphatics should be considered
Detergent enzyme (Subtilisin) 1395-21-7	RESP IRR	0.06	1984					0.06 RESP/ IRR		IRR	INHL H	ACU	8	1	NO	D	AAQC is the ACGIH TLV-TWA which is currently under review; is this protein an environmental hazard?
Diazinon 333-41-5	H	3	1977					100 CV/NS		SYS	ORAL A	SUB	15	13[3]	?	C	AAQC derivation not specified and therefore should be reviewed. The difference between the current AAQC and the adjusted TLV is not appreciable in this range of concentrations
Dibutyl phtalate (DBP) 84-74-2	H	50	1988	350[5] REP				5000 NS		SYS	ORAL A	SUB CHR	4	0.14[EPA]	?	C	Rationale based on general studies on phtalates and end-point(s) were not reported. Should be reviewed for current data and compared to EPA rationale

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[2]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Dibutyltin dilaurate 77-58-7	H	30	1979							SYS	?	?	13			C	Unsupported computations in the rationale; AACQ based on the TLV/UF for other compounds; new info could be available
1,2-Dichloro-1,1,2,2,-tetrafluoroethane (Freon 114) 76-14-2	CV/ BL	700 mg	1988					6900 mg CV/BL		SYS	?	?	4	43[3]	NO	D	Under review by a federal-provincial panel for CFC Regulation. For comments see chlorodifluoromethane (Freon 22)
Dichlorobenzene, ortho 95-50-1	H	30500 1 hour	?	315[3] General effects		700 (para) GI/LV			82	SYS EPA	ORAL A	CHR + SUB	?	-	?	B	ARB/OMOE rationale was not available although indications suggest that it was based on a TLV. Different end-points are reported as an 1 hour value for the AAQC is likely to be based on IRR
Diethylene glycol monobutyl ether 112-34-5	LIV	65	1988							SYS	INHL A	SUB	4			C	AAQC was based on a sub-chronic (5 weeks) inhalation study in rats (blood/liver effects) and was computed based on the NOEL divided by an UF of 200. Should be reviewed for recent data obtained with more appropriate protocols (longer durations of exposure; pulmonary route)

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[2]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Diethylene glycol monobutyl ether acetate 124-17-4	LIV	85	1988							SYS	INHL A	SUB	4			C	AAQC was based on ethylene glycol monobutyl ether NOEL (0.01 ppm). Should be reviewed for info. on the acetate form
Diethyl phtalate (DEP) 84-66-2	H	125	1988	2800[3] REP						SYS	ORAL A	SUB	4	0.05	?	C	Rationale based on general studies on phtalates and end-point(s) were not reported. Should be reviewed for current data and compared to EPA rationale
Difluorodichloromethane (Freon 12) 75-71-8	H	500 mg	1975	700[3] WOT▲				5000 CV		SYS	ORAL A	CHR	17	714[EPA]	NO	D	Under review by a federal-provincial panel for CFC Regulation. For comments see chlorodifluoromethane (Freon 22)
Dihexyl phtalate (DHP) 84-73-3	H	50	1988										4			C	Rationale based on general studies on phtalates and end-point(s) were not reported. Should be reviewed for current data and compared to EPA rationale

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[3] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Dimethyl acetamide, n,n- 127-19-5	LV	300	1988					36 mg		SYS	INHL A	SUB	4	3.5[3]	NO	C	AAQC was based on the same study as ACGIH and the NOAEL was divided with an UF of 100, and a subsequent MF of 5 to correct for continous exposure. However, it should be corrected with an UF of 420 (see footnotes). An additional MF of 5 should also be considered to correct from SUB to CHR exposure scenarios. The AAQC should then be = 17 ug/m^3

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Dimethyl methylphosphonate 756-79-6	H	875	1988	Under Review									4			D	AAQC was based on the lowest oral value administered to rats that was considered to be a NOEL (AAQC = NOEL÷1000). This compound is currently under review by the US EPA in view of the observations from a recent NTP study reporting kidney tumors in male rats. The authors of the OMOE rationale concluded that "DMMP should be placed on the list of chemicals to be reviewed on a regular basis given the insufficient data on carcinogenic activity and the lack of NOEL". Should remain unchanged until EPA report is available
Dimethyl phtalate (DMP) 131-11-3	H	125	?					5000 NS		SYS	INHL A	SUB CHR	?		YES	D	See comments on other phtalates
Dimethyl-1,3-diamino propane, n,n- 109-55-7	H	20	1987							IRR	INHL H	ACU	5			B	AAQC was a provisional guideline based on a cross-sectional study judged to be inadequate for environmental standard setting. Although based on IRR, no rationale was given for a 24 hour-based value

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Dioxolane-1,3 646-06-0	H	10	1987	140[2]						?	?	ACU	5	0.07	?	C	Detailed toxicological data for deriving the AAQC was not reported: the NOEL from a single injection study was divided by a UF of 10^5. Consult NYSDEC rationale and other appropriate data-bases for more details and recent data. Due to low AAQC/MR ratio this chemical was classified "C" for review/up-date
Diphenylamine 122-39-4	BL	18	1988	88[3] KID/ LIV				10,000 GI/LV/ KID	0.68	SYS	ORAL A (D)	CHR	4	0.2^{EPA}	NO	C	AAQC was based on the ADI proposed by HWC and considers that 30% of the exposure occurs through inhalation. ADI based on a sub-chronic study in mice (chronic study in dogs retained by the EPA was judged statistically inadequate). This AAQC is based on a good rationale but considerations should be given to inter-routes of exposure for possible portal-of-entry effects with appropriate dosimetric factors

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[2] (EP)	MASS (EP)	Irr/ Syst[2]	Inh/ Oral H A[1]	Sub/ Chr[2]	T	AAQC/ MR	LE/EP	CI	Comments
Diquat dibromide-respirable 85-00-7	SYS	0.032	1989	7.7[3] OCC						SYS OCC	ORAL A	CHR	3	0.004	?	C	Good rationale was provided for AAQC which was based on a sub-chronic animal inhalation study (inhalation is purported to be the more relevant route of exposure for diquat dibromide). However, information on the critical(s) end-point(s) was not provided and the approach used to calculate the AAQC (including the use of UF) was confusing. The inhalation study should be reviewed for clarification of the above mentioned factors
Diquat dibromide-total in ambient air 85-00-7	SYS	0.16	1989							SYS OCC	ORAL A	CHR	3		?	C	Respirable is < 5um and is a fraction of total DQ dibromide in ambient air. See above for consideration on AAQC validity

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Dodine 2439-10-3	H?	10	1987	14[3] THY	35[4]					SYS	ORAL A(D)	SUB	5	0.7[EPA]	?	C	AAQC was based on the WHO ADI. However, no rationale was provided for AAQC computation. The original papers were not reviewed and AAQC was suggested as a provisional guideline. EPA confidence in its principal study was rated LOW. No RfC available. Due to the similarity between AAQC and the estimated RfC, AAQC could be rolled-over once the nature of the effects on which the AAQC was based will be ascertained, that effects are independent of the route of exposure, and that the RfD will be adjusted for dosimetric considerations, if any.

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Droperidol 548-73-2	SYS	1.0	1977							SYS TRA	Clin. studies on H ?	?	15			C	Therapeutic agent. AAQC was based on the therapeutic dose/100. No consideration was given to clinical findings for steady-state concentrations and dosing schedule relevant to environ. exposure scenarios. However: 1) due to the low value of the AAQC; 2) considering that a 100 UF may be appropriate when applied to the therapeutic dose; 3) considering that environmental exposure of the general population to a therapeutic agent is unlikely to occur to a great extend; 4) and considering that no complaints on the actual AAQC have been registered in the past 15 years; then it is assumed that the AAQC for droperidol can be adopted as a standard following appropriate corrections for inter-route of exposure, if required

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Ethylanthraquinone, 2- 84-51-5	H	10	1985							?	–	–	7			B	Very limited health data was available for AAQC development; was based on intuition and emission rates. SAR with other anthraquinones may be useful
Ethylene glycol butyl ether 111-76-2	H	2400	1988			20 ?		121 mg REP/BL		SYS	?	?	4	120[CA]	?	B	AAQC was based on TLV but derivation not specified. California rationale should be consulted. Verify odour threshold as it may have been exceeded
Ethylene glycol butyl ether acetate 112-07-2	H	3250	1988	390[2]				31,000		?	?	?	4	[SYSDEC]	?	B	same as above
Ethylene glycol dinitrate 628-96-6	CV	3	1984					310 CV TLV		SYS CV	INHL H	SUB	8	4[3]	NO	A	Good rationale. Based on human inhl. NOAEL was for vasodilatation. Low AAQC/MR ratio when the TLV is divided by a factor of 420 (see footnote [3])

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	Cl	Comments
Ethylene glycol ethyl ether 110-80-5	REP	380	1986	200 REP		200 REP		18,000		SYS REP	INHL A	SUB	6	1.9[EPA]	NO	C	The US EPA value is an RfC for reproductive effects and was rated Medium for confidence. This EPA RfC value was adopted by CA. As the AAQC was derived based on the same effects, and in view of the low AAQC/MR ratio, it is plausible to consider that it may be adopted as a standard following feasibility considerations by ARB management. However, prior to this process, minor considerations related to odour will have to be taken into account. As this will likely require minor changes and editing in the existing rationale, this compound was classified as "C" for review/up-date
Ethylene glycol ethyl ether acetate 111-15-9	REP	540	1986			64 REP		27,000		SYS REP	INHL A	SUB	6	8.0[CA]	NO	C	The CA value was the TLV/420. AAQC was based on the same rationale but with different UF. Should be reviewed accordingly. Verify odour threshold

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL' (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Fentanyl citrate 990-73-8	SYS	0.02	1977							SYS TRA	Clin. studies on H ?	?	15			C	Therapeutic agent. AAQC was based on the therapeutic dose/100. No consideration was given to clinical findings for steady-state concentrations and dosing schedule relevant to environ. exposure scenarios. However: 1) due to the low value of the AAQC; 2) considering that a 100 UF may be appropriate when applied to the therapeutic dose; 3) considering that environmental exposure of the general population to a therapeutic agent is unlikely to occur to a great extend; 4) and considering that no complaints on the actual AAQC have been registered in the past 15 years; then it is assumed that the AAQC for droperidol can be adopted as a standard following appropriate corrections for inter-route of exposure, if required

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Glutaraldehyde 111-30-8	H	14	1986			1.7 IRR		800 IRR		IRR	IRR H	ACU	6	8[CA]	YES	C	OEL (TLV) is based on IRR and is a Ceiling value. CA value was based on TLV/420 for chronic exposure, however, the effects it is aimed at preventing are not specified. The AAQC was originally proposed as a 1 hour average value to prevent IRR, however, the effects that the 24 hour average is aimed at preventig were not specified. Due to the comparable values for long-term effects (AAQC & CA), the AAQC value should be up-dated for new data (exact nature of the end-points, including mutagenicity), and appropriately corrected either for UF or averaging time (1H) if chronic and/or acute effects are demonstrated, respectively

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Haloperidol 52-86-8	SYS	0.1	1977							SYS ?	?	?	15			B	Therapeutic agent. No clear rationale was given for AAQC derivation. No consideration was given to clinical findings for steady-state concentrations and dosing schedule relevant to environ. exposure scenarios. Should be appropriately reassessed
Hexachlorocyclopentadiene 77-47-4	H	2	1985	24[3] RESP/GI/ KD		0.24 GI/LV		100 GI/LV	0.006	SYS	ORAL A	SUB	7	0.08[EPA]		C	AAQC rationale document missing. Review rationale from different jurisdictions to clarify differences in exposure limits
Hexamethyl disilazane 999-97-3	H	2	1984							SYS	?	ACU	8			B	There was no rationale for AAQC derivation. AAQC was tentatively computed by dividing an acute toxic dose by an UF of 50. No information was provided on the origin of the acute dose
Hexamethylene diisocyanate monomer 822-06-9	H	0.5	1986					34 RESP					6	6[3]		C	see below

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Hexamethylene diisocyanate trimer 4035-89-6	IRR IMM	1	1986			1				IRR	?	?	6	1[CA]		B	AAQC was based on the ambient concentration of NCO groups and derived from the TLV value for TDI. Review the TDI TLV value for new data, and more specifically those data related to CARC and mutagenicity (CA recently proposed a screening cancer potency value for TDI)
Hexane 110-54-3	H	12,000	1976	200 NS				73000 NS		SYS NS/ RES	INHL H/A	SUB	16	60[HEA]	NO	B	AAQC derivation not specified although TLV related
Hexylene glycol 107-41-5	H	12,000 (1 hr.)	1987					120 mg		IRR SYS	ORAL A	SUB	5		YES	B	AAQC based on irritation. REP./ BLOOD effects need to be examined
Hydrogen bromide 10035-10-6	IRR	668 1-hour	1988	990[2] IRR 1 hour				10,000 RESP/ IRR		IRR	?	ACU	4	0.7[NYSDEC]	NO	A	Good rationale, AAQC from human NOAEL plus P.F. Data from NYSDEC should be obtained
Hydrogen peroxide 7722-84-1	CV	30	1985					1400 CV SYS		SYS CV	ORAL A	SUB	7	9[3]	NO	C	AAQC computation not specified although TLV related
Maleic anhydride 108-31-6	H	30	1985	350 NOEL		2.4 RESP		1000	0.14	SYS IRR	INHL H	SUB	14	12[CA]	YES	B	AAQC was based on TSP (1/2 hour). Should be reassessd due to different end-point and high variability between values from different regulatory agencies

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Manganese compounds (incl. permanganates) 7439-96-5	H	2.5	1987	0.4 NS/ RESP		0.4 NS/ RESP		1000		SYS NS RESP	INHL A	CHR	5	6.25[EPA]	YES	C	WHO uncertainty regarding effects at 1.0 ug/m³. Review for end-point and AAQC derivation
Methane diphenyl diisocyanate 101-68-8	H (?)	1.0	1976	.12[2]						?	?	?	16	8.3[NYSDEC]	?	C	Acceptable AAQC/MR ratio when compared to NYSDEC value. However, no rationale was provided for AAQC and, consequently, should be reviewed (see NYSDEC rationale)
Methyl bromide 74-83-9	RESP	1350	1984			6.0 GI/LV		20,000 NS RESP	2.64	SYS	?	?	8	225[CA]	YES	B	AAQC was based on a NOAEL derived from animal studies (OEL) corrected with an UF of 50
Methyl chloride 74-87-3	H	7000	1976					100000 NS		SYS	INHL H	SUB	16	29[3]	?	C	AAQC computation not specified
Methyl ethyl ketone peroxide 1338-23-4	H	80	1984					1500 RESP CV		SYS IRR	INHL A	SUB	8	22[3]	?	C	AAQC computation not specified

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Methyl salicylate 119-36-8	TER	100	1976	52 mg[2]						?	?	?	16	0.002 NYSDEC	?	C	Although terstogenicity results were reported in animals, results from potential clinical studies were not discussed. AAQC was based on the belief that exposure should be kept to a minimum; no rationale was provided either for the AAQC value and for conversion to units of ug/m³. Should be reviewed with new data (see NYSDEC) and if appropriate, once corrected for inter-routes of exposure (if required), rolled-over to standard in light of the very low AAQC/MR ratio
Methylal 109-87-5	LIV KID	6200	1987					3100 mg LIV/ KID		SYS	INHL A	ACU	5	0.84[3]	NO	C	Lack of adequate chronic toxicological data; should be reviewed for recent data
Methylcyclopentadienyl manganese tricarbonyl (MMT) 12108-13-3	H	10	1987					100 IRR RESP		SYS	INHL A	ACU SUB- ACU	5	42[3]	YES	C	Good rationale; AAQC based on the AAQC for Mn. Should be reviewed in accordabce with the previous observations for the Mn AAQC, and for MMT specific lung effects as reported following occupational exposure
Miconazole nitrate 22832-87-7	SYS	5	1977							SYS	ORAL A	CHR	15			C	Should be reviewed/up-dated for recent data

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Mineral spirits (Stoddard Solvent) 8052-41-3	IRR	10,000	1987					350 mg IRR NIOSH		IRR	INHL H	ACU	5	12[4]	NO	C	Current data on mineral spirits/Stoddard solvents remains unchanged. AAQC is considered appropriate for protecting against IRR (a 1 hour value should be adopted for irritants). Odour thresholds should be reviewed
Monochlorobenzene 108-90-7	IRR	3500 (1 hr.)	1988	70 GI/LIV		70 GI/LIV		46,000		SYS LIV	ORAL A (D)	SUB	4	50^{EPA}	YES	B	Based on TLV (Irr.). EPA has new evidence on health. Odour review also needed. Should be reassessed on the base of different health end-points and high AAQC/MR ratio
Naphthalene 91-20-3	H	22.5	1987	pend carc.		14[3] CV/BL		50,000 IRR/BL	14.25	CV/ BL	?	?	5	1.5^{CA}	NO	D	Good rationale, wait for EPA QRA review
Naphtol, alpha 90-15-3	TP	100	1976										16			B	AAQC was based on total particulate without any consideration for health effects
Nitroglycerin 55-63-0	CV	3	1984					460 CV		SYS	INHL H	SUB	8	2.7[5]	NO	A	Good rationale. Based on a NOAEL derived from human inhalation studies (vasodilation). Similar end-point and acceptable AAQC/MR ratio when compared to adjusted OEL value

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Nitrous oxide 10024-97-2	SYS LIV KID NS	9000	1986					45mg NIOSH NS		SYS	INH A	ACU SUB- ACU	6	84[4]	NO	C	AAQC was provisional and was based on LIV, KID, and NS effects. Was under review by ACGIH and should therefore be verified for new data. An AAQC/MR ratio of 84 is considered excessive
Octene, 1- 25377-83-7	ACU	50,000	1982					1450 mg TLV ACU		ACU	INHL A	ACU	10	15[5]	NO	C	AAQC was 1/10 of the TLV for octane as compared to an UF of 420 (see footnote [5]). Should be updated with recent data on octene-1 or octane, if available; the exact nature of the end-point should be addressed in order to determine the most suitable averaging time
Oleic acid 112-80-1	RESP	5 (1hr)	1988							RESP	INHL H	SUB	4			A	Therapeutic agent. Therapeutic considerations suggest that the MTD (for asthmatics) without the occurence of any side effects is equivalent to 100 ug/per day
Oxalic acid 144-62-7	H	25	1985					1000 SYS		SYS	?	?	7	11[3]		C	AAQC was based on the TLV. However, no toxicological foundation was reported for the TLV
Palladium-water soluble compounds 7657-10-1	TP	10	1985										7			B	Due to the lack of data, AAQC was 1/10 of the 24 hour value for total particulates

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Paraquat dichloride-respirable 1910-42-5	PUL	0.003	1989	16[3] PUL						SYS PUL	ORAL A(D)	SUB	3	<.001[EPA]	NO	C	Although high confidence was placed in the EPA RfD, the estimated RfC is considered provisional due to the lung-specific toxicity of paraquat. AAQC was based on an human NOEL (no LOEL reported) extracted from an epidemiological study. The validity of this study is unknown and no reference was made to the EPA principal study in dogs (pub. in 1984). AAQC could be overprotective and, in any case, should be corrected for inter-routes of exposure
Paraquat dichloride-total in ambient air 1910-42-5	PUL	0.015	1989							PUL SYS	ORAL A(D)	SUB	3		NO	C	Respirable is < 5um and is a fraction of total in ambient air. See above for consideration on AAQC validity
Penicilin 1406-05-9	H	0.10	1975							IMM			17			C	Rationale based on clinical considerations for hypersensitive individuals. Should be up-dated with current data. AAQC very low and penicilin is unlikely to be an environmental contaminant of concern

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Pentachlorophenol 87-86-5	H	20	1985	105[3] LV/KD				500 SYS	0.01	SYS	ORAL A	CHR	7	0.19[EPA]	YES	C	AAQC lower than estimated RfC. Should be verified/corrected for inter-routes of exposure and nature of the end-point
Phosphine 7803-51-2	H	10	1984	1 BL		10 CV/NS /GI/LV		420 SYS		SYS	ORAL A	CHR	8	10[EPA]	NO	C	AAQC calculation not justified
Phosphorus oxychloride 10025-87-3	H	12	1984					630 RESP		IRR SYS	INHL A	SUB	8	8[5]	NO	C	Rationale not justified
Phosphorus pentachloride 10026-13-8	H	10	1975					850 RESP		SYS	INHL A	SUB	17	5[3]	NO	C	Rationale not justified
Pimozide 2062-78-4	NS	1	1977							NS			15			B	Antipsychotic agent. AAQC was based on the recommendation that emissions be as low as readily achievable. Not based on clinical and/or pre-clinical findings
Platinum-water soluble compounds 7440-06-4	IRR	0.2	1985					1000 SKIN		IRR IMM	?	?	7	0.08[3]	YES	C	Rationale acceptable based on irritation, however uncertainties on skin and immune system sensitization
Propanol, n- (Propyl alcohol) 71-23-8	H	16,000	1976					500 mg NS	133.6	?	?	?	16	119[MASS]		B	No health based rationale was found. The odour threshold could be below standard and should also be reviewed

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Propylene glycol 57-55-6	TP	120	1987										5			A	AAQC based on total particulates. The intrinsic toxicity may be considered low; data for propylene glycol methyl ether indicates an AGC of 880 ug/m^3 (NYSDEC), and the ACGIH has set a TLV-TWA of 360 mg/m^3 (corresponding approximately to 857 ug/m^3). The AAQC may be overprotective
Pyridine 110-86-1	H	150	1986	3.5[5] LV				16,000 KD/NS		SYS	ORAL A	SUB	6	43[EPA]	NO	C	To be reviewed
Selenium 7782-49-2	H	10	1975	17.5[5] LV		0.5 RESP		200 SYS	0.54	SYS	ORAL H	CHR	17	0.57[EPA]	NO	C	AAQC and EPA rationales are both based on the same end-point; acceptable AAQC/MR ratio. However, it should be reviewed in view of the large differences observed between CA/MASS and AAQC/EPA values
Silane 7803-62-5	H	150	1984					6600		SYS	INHL A	SUB	8	10^3	?	C	Rationale not justified

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	Cl	Comments
Sodium chlorate 7775-09-9	HEM	6	1988	2.8[2]						?	?	?	4	2.1[HYSDBC]	?	B	The study on subjects used to derive the AAQC was not properly interpreted for chronic exposure by the pulmonary route (including the UF used). Attention should also be given to dermal and pulmonary irritation and/or effects caused by the high oxidizing power of chlorates, and to mutagenicity
Sodium chlorite 7758-19-2	TP	20	1985							TP			7			B	Based on total particulate. However, should be reviewed for IRR and corrosion (other receptors than humans should be considered). Poor rationale
Stannous chloride (as Sn) 7772	?	10	1985							?	?	?	7			B	No rationale was provided

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Sulphur hexafluoride 2551-62-4	ASP	600 mg	1988					5970 mg ASP		ASP	INHL A/H	ACU	4	1[TLV] MR: TLV/10	NO	C	As the AAQC is based on asphyxiation (TLV/10), that SF_6 is chemically inert, and that no data concerning systemic effects have been reported by regulatory agencies, the current AAQC value, which is the TLV/UF of 10 to take into account sensitive individuals, is considered appropriate for preventing effects of this nature in the general population. However, the averaging time should be reduced from 24h to 1h
Tetrabutylurea 4559-86-8	ROE	10	1985										7			B	The AAQC was considered as tentative pending further information and was specific to the particular conditions anticipated at the plant
Tetramethyl disulphide 137-26-8	NS	10	1977	18[3]						SYS NS	ORAL A	CHR	15	1.8	NO	D	Degree of confidence attributed to the RfD by the US EPA is LOW. AAQC should remain unchanged until new data, and more specifically data by the inhalation route, becomes available

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Tolmetin sodium 35711-34-3	BAT	5	1977										15			B	AAQC based on control of emissions with the BTA. Quantitative results from clinical studies cited in the rationale should be used for establishing the AAQC
Trichlorobenzene, 1,2,4- 120-82-1	IRR LIV	400	1977					37,000 IRR		IRR	INHL H	SUB	15	4.5[3]	NO	C	Rationale acceptable. Should be reviewed/up-dated for new info. on systemic effects
Trichlorofluoromethane 75-69-4	H	6000	1989	1050 NOEL				5600 mg CV		SYS	ORAL A	CHR	3	6.0[EPA]	?	D	Wait for CFC Reg
Trimethylol propane 77-99-6	SYS	1250	1988					50 mg USSR		SYS	INHL A	SUB	4	11[3]	NO	C	AAQC was the TLV/40. When divided by 420 (see footnote [3]) it was 119 ug/m^3. Could be rolled-over following appropriate correction
Tripropyltin methacrylate N/A	H	1	1977										15			B	AAQC was a provisional guideline due to the paucity of data (no rationale)
Vinylidene chloride (1,1-dichloroethene) 75-35-4	H	35	1984	32[5] LV		32 GI/LV		20,000	0.02	SYS	ORAL A	CHR	8	1[EPA]	NO	C	AAQC was based on RfD conversion; some uncertainties exist (i.e. carcinogenicity). Rationale should be reassessed for toxicological end-point(s) and inter-routes factors applied

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inh/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Warfarin 81-81-2	H	10	1987	1.0[3] BL				100 CV		SYS	ORAL A	CHR	5	10^{EPA}	NO	C	Adequate rationale; the value derived is based on RfD and should be adjusted for inter-routes of exposure
Zinc chloride 7646-85-7	IRR	10	1987			35 CV/BL RESP		1000		SYS	?	?	3	0.30	YES	C	Good rationale, however, should be checked against SPHEM document (see CA Hot Spot Document). May be rolled-over following appropriate corrections for inter-routes of exposure

GENERAL ABBREVIATIONS USED IN TABLE C1

ADI	allowable daily intake
ASP	asphyxiation
ANA	analgesic
BAT	best available technology
BL	blood changes
CA	regulated by the State of California
CV	cardiovascular effects
GI	gastrointestinal effects
H	health effects (general, when non specified)
HEM	hematological effects
IMM	immunological effects
IP	review in progress
IRR	irritation
KID	kidney effects
LIV	liver effects
NS	nervous system effects
OCC	occular effects
PUL	pulmonary effects
RESP	respiratory effects
REP	reproductive effects
ROE	rate of emission
SYS	systemic effects (nature not specified)
TER	teratogenicity
THY	thyroid effects
TP	total particulates
TLV	threshold limit value
TRA	tranquilizer
STEL	short-term exposure limit
WGT	weight change or reduced growth
?	requires verification

TABLE HEADINGS

LE	Limiting effect
AAQC	is in ug/m^3 and for 24 hours unless otherwise stated (e.g., mg is for mg/m^3)
Date	year of proposal
EP	End-Point
Time	time in years elapsed since proposal
Inh	inhalation
H	humans
A	animals
Sub	sub-chronic
Chr	chronic
C1	requirements for review/assessment/standard setting; A: it is proposed that the interim standard becomes a standards; B: substantial reduction and/or reassessment; C: review; D: unchanged status (for details see text)

[1]Pertains to the study used by the regulatory agency to develop the environmental standard/guideline retained for comparison purpose (EPA, CA, etc.); when no environmental and occupational standards were identified in the literature, information reported under[1] pertains to studies retained by ARB/OMOE for AAQC development

[2]As per New York State Department of Environmental Conservation (NYSDEC, 1991)

[3]AAQC was divided by TLV/420, where 420 is the uncertainty factor: 4.2 (to extrapolate from a 40 hour work week to a 168 hour full week) times 10 (to extrapolate from healthy workers to sensitives) times 10 (since adverse health effects are often seen at the TLV's)

[4]AAQC was divided by NIOSH PEL/420, where 420 is the uncertainty factor: 4.2 (to extrapolate from a 40 hour work week to a 168 hour full week) times 10 (to extrapolate from healthy workers to sensitives) times 10 (since adverse health effects are often seen at the TLV's)

[5]RfC was estimated from the US EPA RfD by assuming that a 70 kg adult breaths 20 m^3 per day

[6]RfC was estimated from the WHO ADI by assuming that a 70 kg adult breaths 20 m^3 per day

[7]OEL (Occupational Exposure Limits) are generaly reported for a work period of 40 hours per week, unless otherwise stated

APPENDIX D

LIST OF INTERIM STANDARDS BASED ON EFFECTS OTHER THAN HEALTH

TABLE D

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^3$[6])	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^3$[7]) and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Acetophenone 98-86-2	O	850 (10min) 1988		1167 (1hr) rat, 30 day, oral, no effect 1988	100 —— 350	-	-	-	Rat EPA	Oral	17 week	Sys no effect	4			D	The limiting factor used in the setting of the AAQC was odour. The health-based AAQC is derived from the Council of Europe's ADI of 102mg/kg/d. One third of the ADI was allocated to exposure via the inhalation pathway. The AAQC was restricted to 1 hr due to the irritant properties of acetophenone. The EPA has a low confidence in the RfD and an RfC is pending review. Based on the fact that the 1 hour health-based AAQC is only 4 times higher than the estimated 24 hour RfC, it is suggested that the AAQC should remain unchanged until new info on the EPA RfC becomes available
Alkyltoluene sulphonamide, n N/A	P		120 (24h) 1988	TSP 1985	-	-	-	-					4			B	No health-based rationale was provided due to the lack of info on this compound. It was suggested, therefore, that the AAQC be based on Total Suspended Particulate (TSP) for which a value of 120 ug/m3 was suggested in 1988. The toxicology of this compound should be reassessed with new info, if available, or with data from structurally similar tensioactive agents

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3m}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3m}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Aluminium oxide 1344-28-1	P		120 1988	TSP 1986	-	-	10000 / 1000 nuisance dust	-					4	0.12 (120/ 1000) ACGIH	NO	C	Few health-based data was provided due to the lack of toxicological data on this compound. It was suggested, therefore, that the AAQC be based on the TSP standard for which a value of 120 ug/m3 was suggested in 1988. Aluminium oxide is considered as an inert and irritating agent; no data were provided on potential effects following pulmonary dust overload and aluminosis. In view of the low exposure value associated with the AAQC, it is suggested that this value be reviewed for recent data on aluminium dust/aerosols and for values set to prevent pulmonary dust overload and aluminosis, if any

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3eq}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3rn}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Ammonium chloride 12125-02-9	P		120 1988	TSP 1985	-	-	10000 —— 1000 TLV is for ammonium chloride fume.	-	Human ACGIH	Inhl	Acu	Irr, nose, throat, lung	4	0.12 (120/ 1000) ACGIH	YES	C	Ammonium chloride is used in the preparation of medicine and as a food additive. Health-based considerations were not retained for developing OMOE AAQC. It was suggested, instead, that the AAQC should be based on the TSP standard for which a value of 120 ug/m^3 was proposed in 1988. This value of 120 ug/m^3 is significantly lower than the TLV-TWA value for ammonium chloride, and for ammonia (17,000 ug/m^3) which is generated from ammonium chloride; it is also lower than the odour threshold value for ammonia (720-3600 ug m^3). The actual AAQC number provides adequate protection against these effects. However, a new rationale that summarizes these different end-points should be prepared to better support the choice of the TSP value

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(a)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Amyl acetate, iso- 128-92-2	H			53200 TLV-based 1988 IRR	-	-	532000 —— 53200	144.8	?	?	?	?	4	367 (53200/ 144.8) MASS	?	B	Amyl acetates are used in pharmacologic research and are added to foods. The limiting factor used in the setting of the AAQC was health. The AAQC was based on irritation and was derived from the TLV for sec-amyl acetate (comparison of acute toxicity) divided by an uncertainty factor of 12.5. As the MASS value is based on acute as well as systemic effects, and in view of the high ratio (367) between this value and the AAQC, this compound should be reassessed. The odour threshold as reported by AIHA (1188 ug/m^3) is estimated to be 8-fold higher than the MASS value. If required, a 1 hour exposure value should be adopted to prevent irritation

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3[a]}$	CA[3] accept exp limit $\mu g\ m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3[a]}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Amyl acetate, n- 628-63-7	H			53200 TLV-based 1988 IRR	-	-	532000 —— 53200	-	Human, animal ACGIH	Inhl	Acu	Irr, eye, nose, throat, lung	4	1 (53200/ 53200) ACGIH	NO	B	Amyl acetates are used in pharmacologic research and are added to foods. The limiting factor used in the setting of the AAQC is health effects. (Note: n-amyl acetate has an odour.) The AAQC is based on the TLV divided by an uncertainty factor of 10. Based on structure-activity considerations when compared to isoamyl acetate, and in view of the existence of more stringent air levels for the latter compound as suggested by MASS, the n- isomer should also be reassessed.
Amyl acetate, secondary 626-38-0	H			66500 TLV based 1988 IRR	-	-	665000 —— 66500	-	Human, Animal ACGIH	Inhl	Acu	Irr, eye, nose, throat	4	1 (66500/ 66500) ACGIH	NO	B	Amyl acetates are used in pharmacologic research and are added to foods. The limiting factor used in the setting of the AAQC is health. (Note: sec-amyl acetate has an odour.) The AAQC is based on the TLV divided by uncertainty factor of 10. Based on structure-activity considerations when compared to isoamyl acetate, and in view of the existence of more stringent air levels for the later compound as suggested by MASS the secondary isomer should be reassessed

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	LE	Odour based values µg/m³	Particulate or Corrosion based values µg/m³	Health effects based values µg/m³ and EP	EPA[2] RfD µg/kg/d ——— µg/m³[adj]	CA[3] accept exp limit µg/m³	ACGIH TLV-TWA[4] µg/m³ ——— µg/m³[adj] and EP	MASS AAL[5] µg/m³	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Benzoyl chloride 98-88-4	C		125 1984	-	-	-	-	-					8			C	No ARB health-based rationale exists. Benzoyl chloride reacts with water to produce benzoic acid and HCl, which is corrosive. So benzoyl chloride is treated and regulated as source of HCl. Any changes related to the AAQC value for HCl will also influence the benzoyl chloride value
Biphenyl 92-52-4	O	60 (1hr) 1984		50 TLV based 1977 RESP	50 ——— 175	-	1300 ——— 3[9] mouse, 64 day, inhl, resp	-	Rat EPA	Oral	Chr	Sys kidney damage	8	0.28 (50/175) EPA	YES	C	The limiting factor used in the setting of the AAQC is odour. The health-based AAQC is derived from the TLV divided by an uncertainty factor of 20. EPA has medium confidence in the RfD. In view of the low AAQC/MR ratio this compound should be reviewed/up-dated to address systemic effects of concern
Butanol, iso- 78-83-1	O	2640 (10min) 1986		15000 (1hr) TLV based 1985 IRR	300 ——— 1050	-	152000 animal lethality	41.22	Rat EPA	Oral	13 week	Sys ataxia	6			B	The limiting factor used in the setting of the AAQC is odour. The TLV is based on the comparative acute toxicity of isobutanol and n-butanol. The health-based AAQC is derived from the TLV divided by uncertainty factor of 10. AAQC limited to 1 hr due to rapid onset of irritation symptoms. EPA has low confidence in RfD. Should be reassessed to determine appropriate values for systemic effects as reported by the EPA

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3adj}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3cn}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE.EP	Class	Comments
Butanol, n- 71-36-3	O	3100 (10min) 1986		15000 (1hr) TLV based 1985 IRR	100 ——— 350	-	152000 ——— 362[6] human, inhl, occ[13], hearing loss	412.24	Rat EPA	Oral	13 week	Sys ataxia	6			B	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the TLV divided by an uncertainty factor of 10 (TLV is a Ceiling Limit). The AAQC is limited to 1 hr due to irritant properties of n-butanol. Should be reassessed to determine appropriate values for systemic effects as reported by the EPA
Butanol, tertiary 75-65-0	H			30300 (1hr) TLV based 1987 NARC	-	-	303000 ——— 30300	-	Animal ACGIH	Inhl	Acu	Narc, Sys ataxia	5		NO	D	The limiting factor used in the setting of the AAQC is health effects. (Note: tertiary-butanol has an odour.) The AAQC is based on the TLV divided by an uncertainty factor of 10. However, the AAQC is more stringent as it was set as an 1 hour value. ACGIH and EPA report that NTP has conducted inhalation/ teratology studies, subchronic inhalation studies, and drinking-water carcinogenesis studies although results are not available yet. Due to adequate protection offered by the current AAQC against acute effects it is suggested to wait for the outcome of the NTP studies

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(c)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE:EP	Class	Comments
Butyl acetate, n- 123-86-4	O	1000 (10min) 1987		15000 TLV based 1984 IRR	-	-	713000 —— 71300	-	Human ACGIH	Inhl	Acu	Irr, eye, nose, throat	5	0.21 (15000/ 71300) ACGIH	NO	D	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the TLV divided by uncertainty factor of 50. The value is similar to the NYSDEC[10] Annual Guideline Concentration (17,000 ug/m^3), which is 10-fold lower that their Short-Term Guideline Concentration. It is expected, therefore, that the AAQC will provide adequate protection against acute effects from n-butyl acetate. It should be noted, however, than a review of inhalation terstology studies is being carried out by the NTP and any final decision concerning this compound by ARB/OMOE should await further developments

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3c)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE,EP	Class	Comments
Butyl acrylate 141-32-2	P		120 1988	100 animal lethality 1977	-	-	52000 —— 5200	-	Animal ACGIH	Inhl	Acu	Irr, eye, skin	4	0.02 (100/ 5200) ACGIH	YES	D	The limiting factor used in setting the AAQC is the TSP standard because butyl acrylate is a liquid at ambient temperatures. The health-based AAQC is derived from the TLV divided by uncertainty factor of 350, for methyl acrylate (comparable acute toxicity to butyl acrylate). This value is comparable to that adopted in 1988 for TSP. The AAQC/MR ratios, for both AAQC values, are low and therefore are considered adequate to prevent IRR effects in the general population. However, the NTP is reviewing mutagenicity and teratology studies and, therefore, any final decision concerning butyl acrylate by ARB/OMOE should await further developments

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g\ m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(a)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Butyl stearate 123-95-5	P		120 1988	14000 rat, 2 year, oral, no effect 1975	-	-	-	-					4			B	The limiting factor used in setting the AAQC is the TSP standard because butyl stearate is a solid or a liquid at ambient conditions (the melting point is 27.5°C and the boiling point is 223°C). The health-based AAQC was derived from the comparison of the chronic toxicity of butyl stearate and dibutyl phthalate as determined in a 1975 study. The AAQC calculation was confusing and dibutyl phthalate is now recognized as a reproductive toxicant for which the EPA has proposed a RfD. Although a new AAQC proposed in 1988 (based on TSP) could be more stringent than both the 1975 health-based value and EPA estimated RfC for dibutyl phthalate (see Table C-1), butyl stearate should be reassessed for new info on possible health effects due to the numerous uncertainties mentioned above

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(a)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Calcium carbide 75-20-7	C		10 1986	property corrosion 1986	-	-	-	-					6			C see $Ca(OH)_2$	Calcium carbide is a mucous membrane irritant because it reacts with water to produce acetylene and calcium hydroxide, which is corrosive. Thus calcium carbide was treated as a source of calcium hydroxide. As calcium hydroxide is actually regulated as a standard, it is plausible to suggest that calcium carbide be also integrated in this category pending feasibility, management requirements, and future status of calcium hydroxide. It should be noted that for corrosion a 1 hour-based value is more appropriate than a 24 hour-based value and therefore any final decision should be made by factoring in this aspect

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^3$[adj]	CA[3] accept exp limit $\mu g \cdot m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^3$[adj] and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Calcium cyanide (total salt) 592-01-8	P		120 1988	TSP 1981	40 / 140	-	5000 (CN) / 12	-	Rat EPA	Oral	2 year	Sys no effects reprtd.	4	0.9 (120/ 140) EPA	YES	C	The EPA principal study was conducted in 1955. Although a NOAEL of 10.8 mg CN/kg/day (likely for weight loss, thyroid effects, and myelin degeneration) was reported, more recent studies have suggested that LOELs for REP effects in rodents are lower than the EPA-derived NOAEL. NYSDEC[10] lists an Annual Guideline Concentration for cyanide of 12 ug/m^3 based on ACGIH TLV (5000/420 = 12 ug/m^3), while their Short-Term Air Guideline is the U.S Federal Particulate standard (150 ug/m^3, maximum 24 hour concentration not to be exceeded more than once per year). The current AAQC is based on the TSP standard purported to provide adequate protection against health effects caused by potassium cyanide. It should be reviewed for the REP end-points and recent studies and for relevance of the TSP-based value (see NYSDEC[10] rationales)

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[3] RfD $\mu g/kg/d$ / $\mu g/m^3$[res]	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^3$[ca] and EP	MASS AAL[3] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Chloramben 133-90-4	P		120 1988	600 mouse, oral, 2 year, liver cancer 1986	15 / 53	-	-	-	Mouse EPA	Oral	18 mo	Sys liver cell damage	4	2.3 (120/53) EPA	YES	D	The limiting factor used in setting the AAQC is the TSP standard because chloramben is a solid in ambient conditions. No data were provided in the OMOE rationale on the quality of the NCI study used to develop the health-based AAQC (2 dose-groups were used, both were responsive, and liver cell carcinomas were statistically significant in female B6C3F1 mice only). This study was not retained by EPA for setting exposure levels. No reference was made in the OMOE rationale to the 1977 Union Carbide chronic feeding study in CD-1 mice. Although the AAQC was based on the assumption of carcinogenicity, no QRA was carried out (instead, it was based on a LOAEL divided by an uncertainty factor of 5000). A new AAQC based on TSP was then proposed in 1988 giving an AAQC/MR ratio of 2.3. EPA's carcinogenicity assessment is pending review and, thus, current AAQC (an acceptable 2.3-fold higher than estimated RfC) should remain unchanged until new info becomes available

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[1] RfD $\mu g/kg/d$ / $\mu g/m^3$[adj]	CA' accept exp limit $\mu g\ m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^3$(?) and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Decane, n- 142-18-5	H			60000 (1hr) TLV based 1987 IRR	-	-	-	-				Irr	5			C	The AAQC is based on the TLV for nonane extrapolated to n-decane. The TLV for n-alkanes is based on the comparison of irritation and narcotic effects. The TLV decreases by 100 ppm for every increment of one carbon atom in the n-alkane structure (eg. TLV for pentane is 600 ppm and for nonane is 200 ppm). The TLV for nonane, 600000 $\mu g/m^3$, was divided by an uncertainty factor of 10. The AAQC is limited to 1 hr due to irritation properties of n-decane. The AAQC should be reviewed with recent data in light of the possible (tumour) promoting activity of n-decane. The current value may be adequate to prevent short-term IRR. (Note: n-decane has an odour.)
Diacetone alcohol 123-42-2	O	1350 (10min) 1987		23800 TLV based 1987 IRR	-	-	238000 / 23800	-	Human ACGIH	Inhl	Acu	Irr, eye, nose, throat	5	1 (23800/ 23800) ACGIH	NO	C	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the TLV divided by uncertainty factor of 10. Could be rolled-over following an appropriate update for averaging time (1 hour vs 24 hour)

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(b)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE EP	Class	Comments
Dibutylamine 111-92-2	H			2645 (1hr) TLV based 1988 IRR	-	-	-	-					4			C	The AAQC is based on the comparison of irritation effects of dibutylamine and n-butylamine and is computed based on a TLV of 26450 $\mu g/m^3$ divided by an uncertainty factor of 10 for n-butylamine. The AAQC is limited to 1 hour due to irritation properties of dibutylamine. Should be updated for health data on dibutylamine although the current SAR-based 1 hour AAQC value may be considered appropriate to prevent irritative effects. (Note: dibutylamine has an odour.)
Diethylamine 109-89-7	H			2910 (1hr) TLV based 1988 IRR	-	-	30000 / 3000	4.07	?	?	?	?	4		?	B	The AAQC is based on the TLV divided by an uncertainty factor of 10 and was limited to 1 hour due to the irritative properties of diethylamine (the ACGIH TLV for diethylamine was based on the comparative toxicity between ammonia [TLV of 17000 $\mu g/m^3$] and diethylamine). Although the current AAQC may be appropriate to prevent acute effects such as IRR, data concerning the chronic health effects induced by this compound should be assessed in view of the very low AAL suggested by MASS. Odour threshold should also be reviewed

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(eq)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(e)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE EP	Class	Comments
Diethylene glycol monoethyl ether 111-90-0	O	1100 (10min) Date N/A		1400 rabbit, 90 day, dermal, kidney 1988	-	-	-	-					4			C	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from a 90-day study in rabbits and the NOAEL was divided by an uncertainty factor of 100 (instead of 1000 to allow for uncertainties in using a sub-chronic study). However, the author of the rationale failed to retain a 3 generations chronic study in rats exposed through drinking water to various concentrations of the chemical; this study provides a NOAEL and LOEL for growth reduction, and is more appropriate for standard setting. The provisional RfC calculated, however, is similar to the 24h AAQC (1400 ug/m³). The rationale must be reviewed for appropriate data and for possible dosimetric adjustment for inter-routes of exposures
Diethylene glycol monoethyl ether acetate 112-12-5	H			1800 1988	-	-	-	-					4			C	Diethylene glycol monoethyl ether acetate (DGEEA) is metabolized to diethylene glycol monoethyl ether (DGEE) in rat blood. The AAQC for DGEEA is based on the comparison of toxic effects to DGEE. Review for specific data and/or update based on new info on DGEE. (Note: DGEEA has an odour.)

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3}$[adj]	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3}$[adj] and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Diisobutyl ketone 108-83-8	O	649 (10min) 1987		3500 TLV based 1987 IRR	-	-	145000 / 14500	-	Human ACGIH	Inhl	Acu	Irr	5	0.24 (3500/ 14500) ACGIH	NO	C	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the TLV divided by an uncertainty factor of 42 (4.2 to extrapolate from a 40 hour work week to a 168 hour full week, and 10 to address inconsistencies in the data-base). The rationale for this compound should be reviewed/updated for new info and to address appropriate averaging times if IRR is the main end-point to be retained
Dimethylamine 124-40-3	H			1840 (1hr) TLV based 1988	-	2 EPA based	9200 / 22[9]	-	Rats, mice ACGIH	Inhl	2 year	Sys nasal toxicity	4			B	The AAQC is based on a previous TLV of 18000 $\mu g/m^3$ divided by uncertainty factor of 10. The TLV was lowered in 1991 from 18000 to 9200 ug/m^3 (previous TLV based on a 13 week rat inhalation study in which the observed effect was decreased body weights). The AAQC is limited to 1 hour due to the irritant properties of dimethylamine. The RfC was withdrawn by the EPA; an RfD is pending review; and a CA rationale of 2 ug/m^3 suggests systemic effects. Therefore, the AAQC should be reassessed for appropriate end-points, and the current value set to prevent IRR should also be up-dated (1 hour-based) based on the new TLV value. (Note: dimethylamine has an odour)

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(a)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Dimethyl ether 115-10-6	O	2100 (24hr)[12] 1975		1300 TLV based 1975	-	-	-	-					17			B	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the comparison of the anesthetic effect of dimethyl ether and diethyl ether. A ratio of anesthetic concentrations in cats was applied the to diethyl ether TLV of 1210000 $\mu g/m^3$; the TLV was multiplied by overall uncertainty factor of 16/10. Should be reassessed with appropriate and specific health-based data if available
Dodecyl benzene sulphonic acid 1886-81-3	P		120 1988	TSP 1985	-	-	-	-					4			B	The limiting factor used in setting the AAQC is the TSP standard. This allows for several suspended particulate-based contaminants, emitted from one facility, to be regulated at the POI Limit of 100 $\mu g/m^3$ for particulates. Should be reassessed with specific health-based data if available. Conversely, SAR should be examined for structurally-related compounds
Ethanol (ethyl alcohol) 64-17-5	O	19000 (1hr) 1976		95000 TLV based 1976 IRR	-	-	1880000 —— 188000	51.24	Human ACGIH	Inhl	Acu	Irr, eye, nose, throat	16	0.5 (95000/ 188000) ACGIH	NO	C	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the TLV divided by uncertainty factor of 20. Should be reviewed/updated either for odour and health-based effects. The low MASS value, suggestive of systemic effects, should be addressed and explained

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^3$[adj]	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^3$[adj] and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Ethyl ether 60-29-7	H			30000 TLV based 1985 IRR	200 / 700	-	1210000 / 121000 human, inhl, occ[13], narc, irr in eye, nose, throat, lung	164.9	Rat EPA	Oral	13 week	Sys dec in body weight	7	43 (30000/ 700) EPA	YES	B	The AAQC is based on the TLV divided by an uncertainty factor of 40. The EPA and MASS values are based on systemic effects and the current AAQC should be addressed accordingly. (Note: ethyl ether has an odour.)
Ethyl hexanol, 2- 104-76-7	O	600 (1hr) 1986		300 animal lethality 1977	-	-	-	-					15			B	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the TLV, for methyl amyl alcohol, divided by uncertainty factor of 333 (comparable acute toxicity). The information reported is confusing. Reassess and/or update for compound-specific effects
Ethyl-3-ethoxy propionate 763-69-9	O	200 (10min) 1987		6500 1986	-	-	-	-					5			B	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the manufacturer's recommendation of 325000 $\mu g/m^3$ divided by uncertainty factor of 50. Reassess and consider toxicity data on structurally-related compounds (SAR)

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g\ kg/d$ / $\mu g/m^{3(6)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3(7)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Ethylene glycol 107-21-1	H			12700 (1hr) TLV based 1988 IRR	2000 / 7000	2100 TLV based IRR	125000 / 12500 human, inhl, acu, irr, nose, throat	34.50	Rat EPA	Oral	2 year	Sys kidney toxicity and pro-teinuria	4		YES	B	The AAQC is based on the TLV divided by uncertainty factor of 10 (TLV is a Ceiling Limit and is under review). The current AAQC may be appropriate to prevent IRR. However, an health-based value for systemic effects is also available from EPA, CA, and MASS on this compound (EPA has high confidence in RfD). A reassessment for systemic effects is thus recommended. (Note: ethylene glycol has an odour.)
Ethylene glycol monohexyl ether 112-25-4	H			2500 rat, 13 week, inhl, dec body weight, inc liver and kidney weight 1987	-	-	-	-					5			C	The AAQC is derived from the NOAEL divided by an uncertainty factor of 100. Should be reviewed for Safety Factor attribution (*i.e.*, uncertainties related to the use of a sub-chronic study for standard setting) and characteristics of the inhalation study used to derive the AAQC. (Note: ethylene glycol monohexyl ether has an odour.)

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3m}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3m}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Ethylenediaminetetraacetic acid 60-00-4	P		120 1988	TSP 1985	-	-	-	-					4			C	Ethylenediamine tetraacetic acid (EDTA) is solid at room temperature. After discussion of the toxicity data, application of the TSP standard was considered to be most appropriate. However, the rationale does not provide adequate information as to whether health-based data should or should not be considered for AAQC setting (EDTA is a chelating agent that mobilizes essential elements and may induce homeostatic disturbances). It is suggested, therefore, that this compound be reviewed/updated for specific EDTA data
Fluorinert 3M-FC-70 N/A	P		120 1988	-	-	-	-	-					4			B	Fluorinert is a perfluorocarbon. The AAQC rationale is unavailable. **Reassess**
Gasoline 8006-61-9	-	-	-	-	-	-	890000	-					-			D	The TLV is limited to the bulk handling of gasoline and is based on the hydrocarbon content of gasoline vapour. CA developed a unit risk factor of 1.2×10^{-4} $(\mu g/m^3)^{-1}$ for gasoline vapours. An AAQC for gasoline is currently under development by the ARB and changes in the current AAQC should await ARB's new recommendations

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[1] RfD $\mu g/kg/d$ / $\mu g/m^{3(a)}$	CA[1] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3(n)}$ and EP	MASS AAL[3] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Isobutyl acetate 110-19-0	O	1660 (10min) 1987		12700 TLV based 1987 IRR	-	-	700000 / 70000	193.77					5	0.18 (12700/ 70000) ACGIH	NO	B	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the TLV divided by uncertainty factor of 31 (?). The TLV for isobutyl acetate is based on the comparison of irritation effects to n-butyl acetate. MASS has a lower value, likely to prevent systemic effects. Therefore, the current AAQC should be reassessed for IRR (1 hour-based value) and possible relevant systemic effects with health-specific data
Isopropyl acetate 108-21-4	O	2000 (10min) 1987		19000 TLV based 1986 IRR	-	-	1040000 / 104000	283.81					5	0.18 (19000/ 104000) ACGIH	NO	B	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the TLV divided by uncertainty factor of 50. According to ACGIH, the irritative and narcotic potential of alkyl esters increases as a function of molecular weight and volatility. The TLV for isopropyl acetate is based on its comparative toxicity to ethyl acetate. Should also be assessed for the presence of systemic effects as suggested by the substantially lower value proposed by MASS. A 1 hour-based value should be considered to protect against IRR

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3(c)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Isopropyl benzene 98-82-8	O	100 (1hr) Date N/A		-	40 140	-	246000 24600 mouse, inhl, acu, narc	-	Rat EPA	Oral	194 day	Sys inc kidney weight	-			B	No ARB health-based rationale exists although EPA and ACGIH have proposed values for systemic and acute effects, respectively. An RfC is pending EPA review. Nevertheless, the AAQC should be reassessed in order to provide a provisional interim value for health-based effects until EPA conclusions will be made available

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	LE	Odour based values µg/m³	Particulate or Corrosion based values µg/m³	Health effects based values µg/m³ and EP	EPA[2] RfD µg/kg/d / µg/m³[eq]	CA[3] accept exp limit µg/m³	ACGIH TLV-TWA[4] µg/m³ / µg/m³[eq] and EP	MASS AAL[5] µg/m³	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Malathion 121-75-5	P		120 1988	300 1976	28 / 98	-	10000 no effects on blood cholin-esterase	-	Human EPA	Oral	56 day	Sys dec red blood cell cholin-ester-ase activity	4	1.2 (120/98) EPA	?	D	The limiting factor used in setting the AAQC is the TSP standard. The reason for the selection of the TSP standard as a basis for the regulation of malathion is that if health effects (24 hour AAQC of 300 µg/m³) has been chosen as the limiting factor then the equivalent ½ hour POI would be 900 µg/m³ (300 µg/m³ * 3). However, the TSP standard (½ hour POI of 100 µg/m³) is more conservative (relying on the over-riding effect of the existing TSP standard) and would result in lower emissions. The derivation of AAQC was not specified. Differences in end-points between AAQC and EPA values are reported (EPA has medium confidence in RfD). However, based on the low AAQC/MR ratio which should adequately prevent health effects (when compared to the provisional RfC calculated from the EPA RfD), and based on the fact that an RfC is pending EPA review, the current AAQC should be retained until new regulatory information becomes available

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3(a)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Mercaptobenzothiazole disulfide 120-78-5	P		120 1988	100 animal lethality 1978	-	-	-	-					4			B	The limiting factor used in setting the AAQC is the TSP standard. The reason for the selection of the TSP standard as a basis for the regulation of mercaptobenzothiazole disulfide emissions is that if health effects (24-hour AAQC of 100 $\mu g/m^3$) had been chosen as the limiting factor then the equivalent ½ hour POI would be 300 $\mu g/m^3$ (100 $\mu g/m^3$ * 3). However, the TSP standard (½ hour POI of 100 $\mu g/m^3$ is more conservative (relying on the over-riding effect of the existing TSP standard), and would result in lower emissions. The health-based AAQC is based on the analogy to 2-mercaptobenzothiazole (comparable intraperitoneal LD50 to mercaptobenzothiazole disulphide). An uncertainty factor of 13600 was used. The current AAQC (based on the TSP value) should be reassessed with compound-specific data to address health effects. Conversely, appropriate SAR should be considered

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3[6]}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3[7]}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Metaldehyde (acetaldehyde tetramer) 108-62-3	P		120 1988	9000 TLV based 1986 IRR	-	-	-	-					4			B	The limiting factor used in setting the AAQC is the TSP standard. The AAQC is based on the eye irritation threshold of 90000 $\mu g/m^3$, for acetaldehyde, divided by uncertainty factor of 10,. In the body metaldehyde depolymerizes to acetaldehyde. Since metaldehyde is a solid at room temperature it was recommended that the TSP standard be adopted. IARC and EPA have classified acetaldehyde as possible and probable human carcinogen, respectively. For acetaldehyde, the EPA RfC is 9 $\mu g/m^3$ and the RsC for 1/100000 risk is 5 $\mu g/m^3$. CA adopted EPA numbers. Massachusetts classified acetaldehyde as Substance 2 with AAL of 0.44 $\mu g/m^3$. Based on these observations, the current AAQC should be reassessed with considerations for the metabolism of metaldehyde and the possible ensuing carcinogenicity of the acetaldehyde metabolite
Methacrylic acid 79-41-4	O	2000 (24hr)[12] 1975		-	-	-	70000 —— 167[7]	-	Rat ACGIH	Inhl	20 day	Sys renal congestion	17	12 (2000/ 167) ACGIH	YES	B	Should be assessed as no ARB health-based rationale exists for AAQC

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[3] RfD $\mu g/kg/d$ / $\mu g/m^3$[adj]	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^3$[adj] and EP	MASS AAL[5] $\mu g\ m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Methoxychlor 72-43-5	P		120 1988	100 1976	5 / 18	-	10000	-	Rabbit EPA	Oral	Gestation day 7-19	Sys loss of litters	4	5.6 (100/18) EPA	YES	C	The limiting factor used in setting the AAQC is the TSP standard. The reason for the selection of the TSP standard as the basis for the regulation of methoxychlor emissions is that if health effects (24-hour AAQC of 100 $\mu g/m^3$) had been chosen as the limiting factor then the equivalent ½ hour POI Limit would be 300 $\mu g/m^3$ (100 $\mu g/m^3$ * 3). However, the TSP standard (½ hour POI of 100 $\mu g/m^3$ is more conservative (relying on the over-riding effect of the existing TSP standard), and would result in lower emissions. The derivation of the AAQC and the TLV is not specified. The AAQC should be reassessed for reproductive toxicity as reported by EPA. However, the current health-based AAQC is classified in Group C for review/update in view of the low AAQC/MR ratio ($\leq$ 10) and the LOW confidence rating attributed by the EPA to the RfD

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3(a)}$ and EP	MASS AAL[5] $\mu g \cdot m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Methyl isobutyl ketone 108-10-1	O	1200 (24hr)[12] 1975		41000 TLV based 1975	-	-	205000 / 488[9]	1155.7	Human, Animal ACGIH	Inhl	Acu, 2 week	Irr, nose, throat, lung, Sys inc kidney weight	17	84 (41000/ 488) ACGIH	NO	C	The limiting factor used in setting the AAQC is odour. The TLV was lowered in 1979 from 410000 to 205000 $\mu g/m^3$. The health-based AAQC is derived from the previous TLV divided by uncertainty factor of 10 and, therefore, should be reviewed for systemic and acute effects. Consideration should also be given to MASS value. RfC is pending review by EPA. Although the current 24 hour-based odour value may be protective for health effects when compared to the adjusted TLV (488 ug/m^3; AAQC/TLV = 2.4) and MASS values (AAQC/MASS = 1.04), a new rationale that will address more recent health data on this compound is required; a decrease in the allowable time of exposure for the odour end-point (from 24 hours to 10 min) and for irritation (1 hour-based value) must also be considered. In view of the protection afforded by the current odour-based AAQC, this compound is classified C
Methyl mercapto aniline 2987-53-3	-	-	-	-	-	-	-	-					-			B	The AAQC rationale is unavailable and, therefore, should be assessed

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[3] RfD $\mu g/kg/d$ —— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(n)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Methyl styrene, alpha 98-83-9	H			24000 (1hr) TLV based 1987 IRR	-	-	242000 —— 24200	-	Human ACGIH	Inhl	Acu	Irr, eye	5		NO	D	A lower 24-hour TWA value than the current AAQC was proposed by Calabrese[11] to prevent IRR. However, the AAQC can be considered adequate to prevent IRR as it is an 1 hour value based on the TLV divided by an uncertainty factor of 10. This value should be considered provisional pending availability of results from an NTP inhalation bioassay (carcinogenicity). (Note: alpha-methyl styrene has an odour.)
Methyl-2-hexanone, 5- 110-12-3	O	630 (10min) 1986		4600 1984	-	-	-	-					6			B	The limiting factor used in setting the AAQC is odour. The health-based AAQC rationale is unavailable. Reassess
Methyl-2-pyrrolidone, n- 872-50-4	H			40000 (1hr) 1988	-	-	-	-					4			B	The health-based AAQC rationale is unavailable. Reassess. (Note: n-methyl-2-pyrrolidone has an odour.)
Methyl-n-amyl ketone 110-43-0	H			4600 rat, monkey, inhl, 10 month, no effect 1984	-	-	233000	-					8			C	Methyl-n-amyl ketone is used as a flavouring agent. The AAQC is derived from the NOEL divided by uncertainty factor of 1000. The TLV seems to be on the prevention of irritation effects. Should be reviewed for current data and to clarify TLV-based value. (Note: methyl-n-amyl ketone has an odour.)

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^3$[calc]	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^3$[adj] and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Molybdenum 7439-98-7	P		120 1988	125 (sol Mo), 250 (insol Mo), TLV based 1988	-	-	5000 (sol Mo), / 12[6] 10000 (insol Mo)	-	Mouse	Inhl	Acu	Irr, nose, throat, lung	4	10 (120/12) ACGIH	NO	B	The limiting factor used in setting the AAQC is the TSP standard because molybdenum compounds are solid and are expected to exist in the atmosphere in particulate form. The AAQC is based on the TLV divided by uncertainty factor of 40. Should be appropriately reassessed to clarify and report rationales for these values. Systemic effects cannot be ruled out.
Octane 111-65-9	O	61800 (10min) 1986		145000 TLV based 1986 NARC	-	-	1400000 / 140000	-	Animal ACGIH	Inhl	Acu	Narc	6	1 (145000/ 140000) ACGIH	NO	C	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the TLV divided by uncertainty factor of 10. The TLV is based on the comparison of narcotic effects with heptane and by analogy to other paraffinic hydrocarbons. The AAQC is considered adequate for the end-point retained, however, the allowed exposure period should be decreased from 24 hour to 1 hour as the former may not be relevant to prevent narcotic effects

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(6)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(7)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Polybutene-1-sulphone N/A	P		120 1988	TSP 1986	-	-	-	-					4			C	Polybutene-1-sulphone is a polymer of 1-butene and sulphur dioxide. This material is a high molecular weight polymer and therefore is not likely to be absorbed into the body. Due to lack of toxicity data, application of the TSP standard was recommended. Should be reviewed and up-dated, especially for data regarding skin sensitization and other topical effects; consider structurally-related compounds

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	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3}$[eq]	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3}$[eq] and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Polychloroprene 25267-15-6	P		500 1975	nuisance dust 1975	-	-	-	-					17			B	Polychloroprene is a polymer of chloroprene (2-chloro-butadiene). The primary hazard of polychloroprene would be due to the presence of the monomer chloroprene. Since there is a measurable quantity of chloroprene present in polychloroprene, it was recommended that polychloroprene be treated as a nuisance dust as it was believed that the associated value would afford protection from the health standpoint. CA developed a unit risk factor of 1.3×10^{-7} for chloroprene; Massachusetts' AAL is 0.98 $\mu g/m^3$; and ACGIH TLV is 36000 $\mu g/m^3$. NTP has conducted mutagenicity and subchronic inhalation toxicological studies (results pending). Based on these considerations, it is suggested that this compound be appropriately reassessed

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3[6]}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3[7]}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Potassium cyanide 151-50-8	P		120 1988	TSP 1985	50 / 175	-	5000 (as CN) / 500 human, inhl, occ[13], irr, respiratory injury	-	Rat EPA	Oral	2 year	Sys no effect	4	0.68 (120/ 175) EPA	YES	C	It was recommended that application of the TSP standard should provide adequate protection against health effects caused by potassium cyanide. EPA has medium confidence in RfD. NYSDEC[10] AGC is based on same end-point as AAQC and the Federal particulate standard is used. The current AAQC is considered protective when compared to the EPA provisional RfC derived from a chronic oral bioassay. However, a rationale summarizing health effects and considerations to inter-routes of exposure should be provided prior to considerations for standard setting
Potassium hydroxide 1310-58-3	C		14 1986	property corrosion 1986	-	-	2000 / 200	-	Human ACGIH	Inhl	occ[13]	Irr, eye, nose, throat	6	0.07 (14/200) ACGIH	YES	C	Specific data on corrosive effects of potassium hydroxide is not available. The alkalinity of potassium hydroxide indicates that it is likely to be at least as corrosive as calcium hydroxide. It was recommended therefore that the AAQC be based on corrosion. This provides protection against IRR in view of the low AAQC/TLV ratio (TLV is a Ceiling Limit). The current AAQC may be considered for standard setting after clarifying whether the 24 hour exposure period should be lowered to a 1 hour period

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[3] RfD $\mu g/kg/d$ —— $\mu g/m^{3(6)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(7)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Potassium nitrate 7757-79-1	P		120 1988	TSP 1987	-	-	-	-					4			C	Potassium nitrate is present in polluted air, drinking water, food (also as a food additive), and is produced endogenously. The FDA recognizes potassium nitrate as safe food additive. Since the available data do not indicate that potassium nitrate poses a significant health risk, application of the TSP standard was recommended. It is suggested, however, that considerations related to multimedia exposure be factored into the standard setting process for nitrate AAQC due to the ubiquity of this chemical compound in various environmental compartments, food, and drinking water (a Relative Source Contribution approach as suggested by Calabrese[11] may be adopted for this compound). This approach should prevent air concentrations to be excessively high when considered in conjunction with other routes of exposure
Propanol, iso (isopropyl alcohol) 67-63-0	O	24000 (24hr)[12] 1976		49000 TLV based 1976 IRR	-	-	983000 —— 98300	-	Human ACGIH	Inhl	Acu	Irr, eye, nose, throat	16	0.5 (49000/ 98300) ACGIH	NO	C	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the TLV divided by an uncertainty factor of 20 to prevent irritation. Should be reviewed/up-dated with new data, if available as per 1976. The exposure period for irritation should be revised from 24 hour to 1 hour

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3(b)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Propionaldehyde 123-38-6	O	10 (10min) 1987		odour [6] 1987	-	-	-	-					5			C	Due to lack of toxicity data in 198", the AAQC was based on odour. Review/up-date for recent health and odour values, if available
Propionic acid 79-09-4	O	100 (1hr) 1978		3400 TLV based 1978 IRR	-	-	30000 / 3000	-	Human ACGIH	Inhl	Occ[13]	Irr, eye, nose, throat	14	1.1 (3400/ 3000) ACGIH	NO	C	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the TLV divided by uncertainty factor of 10. The TLV is based on the analogy of irritation effects with acetic acid. Considered adequate to prevent IRR effects and a decision should be made on whether to lower from 24 hour to a 1 hour-based value
Propionic anhydride (as propionic acid) 123-62-6	O	100 (1hr) 1978		5810 TLV based 1978 IRR	-	-	-	-					14			C	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the TLV of 20000 $\mu g/m^3$ (Ceiling Limit, for acetic anhydride, divided by an uncertainty factor of 5 (comparable acute toxicities). Propionic anhydride reacts with water to produce propionic acid. Therefore, the AAQC for propionic acid (3400 ug/m^3 to be considered as an 1 hour value) may be adequate to prevent irritation. Review/up-date

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg \cdot d$ —— $\mu g/m^{3eq}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3eq}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Propylene glycol methyl ether 107-98-2	O	121000 (10min) 1986		odour 1986	2000 RfC	-	369000 —— 36900 human, inhl, acu, irr, eye	-	Rat, Rabbit EPA	Inhl	13 week	Sys seda-tion	6		YES	B	The limiting factor used in setting the AAQC us odour. Propylene glycol methyl ether (PGME) causes central nervous system depression and liver and kidney effects at high doses. Since PGME appears to be relatively non-toxic, the reviewer of the health effects recommended that the AAQC should be based on odour. EPA has medium confidence in the RfC, however, as this value is appropriate for inhalation exposure it should be considered for standard setting. The AAQC should therefore be reassessed accordingly

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[3] RfD $\mu g/kg/d$ —— $\mu g/m^{3eq}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3cn}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Propylene glycol monomethyl ether acetate 108-65-6	O	5000 (24hr) 1986		odour 1986	-	-	-	-					6			B	The limiting factor used in setting the AAQC is odour. Propylene glycol monomethyl ether acetate (PGMEA) is metabolized to propylene glycol monomethyl ether to a large extent with the liberation of acetic acid in the nasal mucosa. The acetic acid causes irritation and the systemic toxicity caused by PGMEA is similar to that of PGME (nervous system depression, liver and kidney effects). Therefore, it is recommended that short (1 hour) and long-term AAQCs (24 hour) be developed for this compound. A decision will have to be made on whether the odour-based value will be retained (could be higher than the short-term value)

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\frac{\mu g/kg/d}{\mu g/m^{3(a)}}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\frac{\mu g/m^3}{\mu g/m^{3(a)}}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Sodium bisulphite 7631-90-5	P		120 1988	120 TLV based 1987 IRR	-	-	$\frac{5000}{500}$	-					4	0.24 (120/ 500) ACGIH	NO	C	The limiting factor used in setting the AAQC is the TSP standard. This allows for several suspended particulate-based contaminants, emitted from one facility, to be regulated at the POI Limit of 100 $\mu g/m^3$. Sulphur dioxide is the active ingredient in sodium bisulphite. The TLV for sodium bisulphite is much lower than the TLV for sulphur dioxide in order to prevent the build up of sulphur dioxide in small areas of sensitive tissue. The health-based AAQC is derived from the TLV divided by an uncertainty factor of 42 to prevent irritation. This value seems appropriate when compared to the adjusted TLV (AAQC/MR = 0.24). However, should be corrected for an exposure period of 1 hour. Sodium bisulphite is a food additive. It is suggested therefore that the ADI rationale be reviewed for possible indications of systemic effects; the ADI value could also be used for AAQC setting. Considerations should be given to multimedia exposure and Relative Source Contributions be factored in the standard setting process

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3[6]}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3[7]}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Sodium cyanide 143-33-9	P		120 1988	TSP 1985	40 / 140	-	5000 (as CN) / 500 human, inhl, occ[15], irr, respiratory injury	-	Rat EPA	Oral	2 year	Sys no effect	4	0.86 (120/ 140) EPA	YES	C	It was recommended that application of the TSP standard should provide adequate protection against health effects caused by sodium cyanide. The current AAQC is considered protective when compared to the EPA provisional RfC (140 ug/m^3) derived from a chronic oral bioassay. However, a rationale summarizing the health effects and considerations to inter-routes of exposure should be provided as a preliminary requirement for standard setting
Sodium hydroxide 1310-73-2	C		10 1986	property corrosion 1986 IRR	-	4.8 TLV based	2000 / 200 human, inhl, acu, irr, eye, nose, throat	-	Human CA	Inhl	Occ[15]	Irr, eye, nose, throat	6	2.1 (10/4.8) CA	NO	C	Specific data on corrosive effects of sodium hydroxide is not available. The alkalinity of sodium hydroxide indicates that it is likely to be at least as corrosive as calcium hydroxide. California non-cancer acceptable exposure limit is based on the TLV divided by an uncertainty factor of 420 (this procedure is questionable as the TLV is a Ceiling Limit, i.e., for non-cumulative effects). The current AAQC value is considered protective to prevent adverse effects as compared to the adjusted TLV and CA values. However, due to the nature of the end-point being considered, AAQC should be considered as a 1 hour value

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(c)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Strontium 7440-24-6	P		120 1988	TSP 1988	-	-	-	-					4			C	Due to inadequate data on acute and chronic toxicity, application of the TSP standard was recommended. Should be updated
Strontium carbonate 1633-05-2	P		120 1988	TSP 1988	-	-	-	-					4			C	Due to inadequate data on acute and chronic toxicity, application of the TSP standard was recommended. Should be updated
Strontium hydroxide 18480-07-4	P		120 1988	TSP 1988	-	-	-	-					4			C	Due to inadequate data on acute and chronic toxicity, application of the TSP standard was recommended. Should be updated
Strontium oxide 1314-11-0	P		120 1988	TSP 1988	-	-	-	-					4			C	Due to inadequate data on acute and chronic toxicity, application of the TSP standard was recommended. Should be updated

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3(a)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Sulphamic acid 5329-14-6	P		120 1989	TSP 1989	-	-	-	-					3			C	Sulphamic acid is present in food packaging materials. The FDA recognizes sulphamic acid as an indirect food additive and as safe (GRAS). A NOEL from a subchronic feeding study in rats was estimated as 1g/kg/d; divided by an uncertainty factor of 1000 it yields an RfD-equivalent of 1 mg/kg/d. This is equivalent to humans inhaling a concentration of 3.5 mg/m^3. Due to lack of inhalation toxicity data and the fact that sulphamic acid is solid at room temperature, application of TSP standard to the AAQC was recommended, thus providing an AAQC/MR ratio of 0.03 which is considered protective. It is suggested, however, that considerations related to multimedia exposure and relative source contributions be factored in the standard setting process (to take into account exposure through the diet)

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3(c)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Total reduced sulphur N/A	O	40 (1hr) 1977		-	-	-	-	-					14			C	A recent ARB review, available as of 1991, recommended revising the odour-based 1-hour AAQC from 40 $\mu g/m^3$ to 14 $\mu g/m^3$. The criteria that were considered in the revision include odour detection, health effects, vegetation effects, guidelines in other jurisdictions, and technical feasibility. More detailed technical and economic feasibility studies are required.
Trimethyl amine 75-50-3	O	0.5 (1hr) 1979		2700 TLV based 1979	-	-	12000 / 28[9]	-	Rat	Inhl	2 week	Irr, nose, throat, lung. Sys. dec organ weight	13	96 (2700/ 28) ACGIH	NO	B	The limiting factor used in setting the AAQC is odour. The health-based AAQC is derived from the TLV for triethylamine divided by an uncertainty factor of 30. A new TLV of 24000 $\mu g/m^3$ was developed for trimethylamine in the 1980s and then the TLV was lowered to 12000 $\mu g/m^3$ in 1991. The TLV is based on a subacute rat inhalation study in which degeneration of the respiratory mucosa was seen. All pathologic effects except for the degeneration were reversed by the end of 2 week recovery period. Reassess for end-points and appropriate averaging time

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies' Guidelines				Description of Study used as basis of Other Agency Guideline (Most Relevant)				Time Elaps (Yrs)	Comparison of Other Agency and OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate or Corrosion based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3[a]}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3[c]}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/Sys		AAQC/ MR and Other Agency	LE/EP	Class	Comments
Trimethylbenzene, 1,2,4- 95-63-6	H	-		1000 TLV based 1977 IRR	-	-	125000 —— 12500	-	Human ACGIH	Inhl	Acu	Irr, nose, throat	4	0.1 (1000/ 12500) ACGIH	NO	C	The health-based AAQC is derived from the TLV divided by uncertainty factor of 120. Should be verified for appropriate averaging time and end-point. (Note: 1,2,4-trimethylbenzene has an odour.)
Whey powder N/A	P		120 1988	-	-	-	-	-					4			A	The limiting factor used in setting the AAQC is the TSP standard because whey powder is considered to be an inert suspended particulate. No ARB health-based rationale exists. Whey powder is not hygroscopic so it does not have odour problem as milk powder. Maybe considered for roll-over.

GENERAL ABBREVIATIONS USED IN TABLE D-1

AAL - Allowable Ambient Limit
AAQC - Ambient Air Quality Criterion
accept - acceptable
ACGIH - American Conference of Governmental Industrial Hygienists
acu - acute
ADI - Allowable Daily Intake
admin - administration
ARB - Air Resources Branch
assess - assessment
CA - California
CAS - Chemical Abstract Service
chr - chronic
dec - decrease
dur - duration
elaps - elapsed
EP - endpoint
EPA - U.S. Environmental Protection Agency
exp - exposure
FDA - U.S. Food and Drug Administration
GRAS - Generally Recognized As Safe
H - health effects
hr - hour
IARC - International Agency for Research on Cancer
inhl - inhalation
insol - insoluble
irr - irritation
LE - Limiting Effect
LD50 - Lethal Dose at which 50% of the animals die
LOEL - Lowest Observed Effect Level
LOAEL - Lowest Observed Adverse Effect Level
MASS - Massachusetts
min - minute
mo - month
MR - most relevant
narc - narcotic effects
NCI - National Cancer Institute
NOAEL - no observed adverse effect level
NTP - U.S. National Toxicology Program
O - odour effects
occ - occupational
OMOE - Ontario Ministry of the Environment
P - particulate
POI - Point of Impingement

Abbreviations continued
QRA - Quantitative Risk Assessment
rep - reproductive effects
reprtd - reported
resp - respiratory effects
RfC - Reference Concentration
RfD - Reference Dose
RsC - Risk Specific Concentration
SAR - structure activity relationships
sol - soluble
sys - systemic effects
TLV - Threshold Limit Value
TSP - Total Suspended Particulate
yrs - years

Footnotes:

1. As per OMOE. 1992. Summary of Point of Impingement Standards, Ambient Air Quality Criteria (AAQCs), and Approvals Screening Levels (ASLs). OMOE, ARB. Toronto, Ontario.
2. As per U.S. EPA. 1992. Integrated Risk Information System (IRIS). U.S. EPA, Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH.
3. As per CAPCOA (California Air Pollution Control Officers Association). 1992. Air Toxics 'Hot Spots' Program Risk Assessment Guidelines.
4. ACGIH. 1986 and 1991. Documentation of the Threshold Limit Values and Biological Exposure Indices. 5th and 6th Edition. ACGIH, Cincinnati, Ohio.
5. As per Massachusetts Department of Environmental Protection. 1990. The Chemical Health Effects Assessment Methodology and The Method to Derive Allowable Ambient Volume II. Massachusetts Department of Environmental Protection, Office of Research and Standards. Boston, Massachusetts.
6. Inhalation RfC was estimated from the Oral RfD by assuming that a 70 kg adult breathes 20 m^3 of air per day and equal absorption occurs by the inhalation and oral exposure pathways.
7. For local acute effects such as irritation, the TLV was divided by an uncertainty factor of 10 to protect sensitive members of the population in order to compare with the health-based AAQC.
8. Class refers to the requirements for review/assessment/standard setting; A: the interim standard may be considered for standard setting; B: substantial reduction and/or reassessment; C: review; D: unchanged status (for details see text)
9. For systemic toxicants, the TLV was divided by an uncertainty factor of 420, where 420 is the uncertainty factor: 4.2 (to extrapolate from a 40 hour work week to a 168 hour full week) times 10 (to extrapolate from healthy workers to sensitives) times 10 (since adverse health effects are often seen at the TLV's), in order to compare with the health-based AAQC.
10. As per New York State Department of Environmental Conservation (NYSDEC). 1991. New York State Air Guide-1. Guidelines for the Control of Toxic Ambient Air Contaminants. NYSDEC, Division of Air Resources, New York.
11. As per Calabrese, E.J.,and Kenyon, E.M. 1991. Air Toxics and Risk Assessment. Lewis Publishers Inc., Michigan. 662p.
12. According to a memorandum from P. Kupa, dated December 30, 1975, the averaging times for the AAQC of dimethyl ether, methacrylic acid, methyl isobutyl ketone, and isopropanol, should be 1 hour and not 24 hours.
13. Has been observed in a occupational setting (no experimental design).

APPENDIX E

LIST OF HEALTH-BASED STANDARDS

TABLE E

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Arsine 7784-42-1	CARC	5 10 (1/2h POI)	1975	SGC[2]: 0.21 AGC[2]: 0.00024		130/1h		160/TWA ACGIH 2/C NIOSH					17			B	Discrepancies are noted among the air guidelines for arsine suggested by several regulatory agencies. NYSDEC has a 1h-based value (SGC) of 0.21 ug/m³ set to prevent acute effects and an Annual Guideline Conc. (AGC) of 0.00024 ug/m³ for carcinogenic effects. CA has a short-term (1h) value derived from the ACGIH value (8h-TWA) set to prevent acute blood effects. NIOSH has adopted a ceiling (C) value of 2 ug/m³ for cancer. Finally, the 24h AAQC (5 ug/m³) was set to prevent potential carcinogenic effects from inorganic arsenic (the rationale used studies of low quality and the computation approach is questionable; it was suggested that the limit be reviewed). Based on the fact that no consensus exists presently for the occupational and environmental air guidelines for arsine, and in view of the acute and chronic (*e.g.*, cancer) effects induced by arsine and its metabolites, a reassessment is recommended

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Bromine 7726-95-6	IRR NS	20 70 (1/2h POI)	1972	SGC[2]: 1.06 AGC[3]: 160		1.7		660 (TWA) 2000 (STEL) IRR					20			C	No rationale was provided for setting the actual AAQC although irritation and cumulative neurotoxicity were taken into account. Significant differences are noted among guidelines set to prevent long-term effects: OMOE 24h AAQC: 20 ug/m³; NYSDEC AGC: 160 ug/m³; CA: 1.07 ug/m³; TLV-TWA: 600 ug/m³. Based on these values, identfication of the most relevant (MR) study for comparison purpose is problematic. Calabrese notes that air guidelines for bromine should consider irritative effects and, consequently, an AALG of 70 ug/m³ (8h-TWA) was proposed by this author. The actual 24h AAQC of 20 ug/m³ is considered protective against these effects, however, it should be appropriately reviewed and up-dated in order to provide a consistent and defensible rationale. A 1h-based value should be considered in order to prevent IRR. NYSDEC and CA rationales should be consulted

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Carbon monoxide 630-08-0	H	8h: 15700 1h: 36200	1974		8h: 10000 1h: 30000			57000 TWA 458000 STEL					18	1h: 1.6[WHO] 8h: 1.2[abs]	NO	D	Considerations related to health (COHb build-up, cardiovascular effects), effects on other receptors, global warming, and economic and social feasibility (e.g., traffic control) are generally factored into a standard for carbon monoxide. As it is our understanding that this compound is being studied/reviewed by a federal-provincial expert panel, and in view that the 1974 AAQCs are comparable to the most recent guidelines proposed by WHO, it is proposed that the current AAQC remains unchanged until new information becomes available
Chlorine dioxide 10049-04-4	H IRR RESP	30 85 (1/2h POI)	1974	0.2 RfC RESP SGC[2]: 67 AGC[2]: 0.67				280 TWA 830 STEL IRR/RESP		SYS RESP	INHL A	< SUB	18	150[RPA]	NO	C	The AAQC was 1/10th of the TLV set to prevent irritation and chronic effects on the respiratory system. However, no defensible rationale was provided to support this approach. The most relevant guideline was the EPA RfC. Although EPA has low confidence in this RfC, it is based on inhalation data from 2 animal species and was peer reviewed. The availability of an RfC and its corresponding rationale suggest that the review of this compound should not require an extensive effort (Class C). Consideration should also be given to the development of a 1h-based value for irritation

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Copper 7440-50-8	Dust	50	1975	2.4 dusts[2] 0.48 fumes[2]		2.4		200, fume 1000, dusts & mists IRR/SYS		IRR SYS	INHL H	ACU	17	2.5 Calabrese see Comments	NO	D	The reported AAQC value was 1/20 of the dust TLV (1000 ug/m³; this value is still effective today) set to prevent irritation and systemic acute effects. NYSDEC and CA values were also based on the TLV rationale but an uncertainty factor of 420 was used in both cases. As recently reported by Calabrese (1991), however, chronic effects induced by Cu are not likely because the acute toxicity limits exposure and because Cu is an essential element controlled by a homeostatic mechanism and does not tend to bioaccumulate. Calabrese proposes an AALG of 20 ug/m³ for Cu dusts and mists (TLV/10x5). Based on the information reported above, the current AAQC value is considered adequately protective for human populations which, generally, are exposed to low concentrations of Cu dusts

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Cresols 1319-77-3	IRR SYS	75	1975	AGC[2]: 24 SGC[2]: 2400 TLV-based		1800		22000 TWA SYS IRR	12.02 (p- cresol)	IRR SYS ACGIH	INHL A/H	ACU	17	3[NYSDEC] 6[MASS]	NO	D	The AAQC was 1/300 the ACGIH TLV-TWA set to prevent irritation and possible systemic effects by exposure to mixtures of *o-*, *m-*, *p-* cresols. Values from NYSDEC and MASS were also based on the TLV. CA value is based on a former (withdrawn) EPA value. An EPA review is in progress, and cresol (mixed isomers) has been selected by NTP for testing in a continuous breeding study. Isomers of cresols are tumor promoters. As the current AAQC is comparable to NYSDEC, CA, and MASS values set to prevent possible long-term systemic effects (thus providing adequate protection for acute local effects as suggested by the NYSDEC SGC and a corrected TLV-TWA of 2200 ug/m³), and in view that a review is in progress at the US EPA, it is suggested that the AAQC remains unchanged until new information becomes available

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	Cl	Comments
Decaborane 17702-41-9	H	25	1970					250/TWA 750/STEL		ACU SYS	Various Routes A/H	ACU SUB	22	42[3]	NO	B	AAQC was 1/10 of the ACGIH TLV. This computation is considered appropriate for irritation, but may not be protective enough against systemic effects. The current TLV (which remains unchanged) is derived by analogy with diborane and pentaborane. Two values are provided to prevent acute (STEL) and long-term (TWA) effects. As the current AAQC was derived based on the TWA, it is expected to account for both systemic chronic and acute effects. However, the information on decaborane should be reviewed/updated for recent and specific data, if available, and a defenaible rationale should be prepared. As mentionned above, potential systemic effects (to be identified and discussed in the rationale) should be addressed with more stringent uncertainty factors (*e.g.*, 420 vs 10)

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Diborane 19287-45-7	IRR SYS	10	1970					100/TWA		IRR NS	INHL A	SUB	22	42[3]	NO	B	AAQC was 1/10 of the ACGIH TLV. This computation is considered appropriate for irritation, but may not be protective enough against systemic effects. The TLV (which remains unchanged) was set to prevent acute pulmonary effects and possible cumulative effects on the central nervous system. This AAQC was indirectly based on a sub-chronic (6 months) inhalation study in rats, guinea pigs, and dogs. However, comments reported in the ACGIH summary document suggest that the study was of low quality as related to the exposure protocol, post-mortem examination of animals, and end-points examined. More specifically, it appears that the TLV-TWA (0.1 ppm; 100 ug/m³) was set at a value approximately 10-fold lower than the concentrations required to kill 10 out of 20 rats, and 1 out of 2 dogs (1-2 ppm). This corresponds to the $LD_{50}/10$. A reassessment is recommended

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Formic acid 64-18-6	IRR	500	1974	AGC[6]: 22 SGC[5]: 2200 TLV-based				9000 IRR		IRR	INHL H	ACU	18	0.6[3]	NO	C	Although not specifically stated in the rationale, the current AAQC (0.25 ppm) was based on the TLV-TWA (5 ppm) divided by an UF factor of = 20, and was set to prevent irritation to the skin, eyes, and mucous membranes. The NYSDEC AGC was also based on the ACGIH TLV, although divided by an UF of 420. This approach, however, is not appropriate for fast-acting chemical, and an AAQC/MR ratio of 0.6 (MR = OEL/10) indicates an adequate margin of protection against irritation. It should also be noted that the EPA withdrawn its RfD pending further review, and an evaluation of formic acid for carcino-genicity is currently in progress. Adequate protection is offered by the current AAQC against irritation, however, a 1h-based value is recommended. Assessment of systemic effects should await further data

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	Cl	Comments
Furfuryl alcohol 98-00-0	IRR	1000	1973	AGC[6]: 95 SGC[2] 9500 TLV-based				40000 TWA 60000 STEL		IRR SYS	INHL H/A	ACU	19	11[3]	NO	B	Although not specifically stated in the rationale, the current AAQC (0.25 ppm) was based on the TLV-TWA (50 ppm) divided by an UF factor of 200; it was set to prevent irritation and sensitization, and potential unknown chronic and respiratory effects. As the current TLV-TWA was lowered to 10 ppm (40000 ug/m³) and that NYSDEC set an AGC to prevent potential chronic effects, we suggest that the rationale for furfuryl alcohol be appropriately reassessed with consideration for short- and long-term effects. Overall, this decision is mainly based on the poor summary document provided by the ACGIH for this compound
Hydrogen cyanide 74-90-8	H															C	File missing
Lithium - other than hydrides 7439-93-2	H	20	1971										21			B	The AAQC proposed, which was mainly for lithium oxide, was not based on any relevant scientific information and its computation was a guesstimate, according to the author. No information was found either in other regulatory agencies' reports and documents. Therefore, it is suggested that this class of compounds be reassessed and that the primary literature be reviewed

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Lithium hydrides 7580-67-8	IRR	2.5	1971					25 TWA IRR		IRR	INHL H	ACU	21	42[3]	NO	B	The TLV was set to prevent nasal irritation although ACGIH recognises the potential adverses effects induced by Li on the nervous system. ACGIH also cites AIHA as reporting that the maximum tolerable concentration of lithium hydride in air for brief periods is 50 ug/m³, *i.e.*, twice the current TLV. Based on the same rationale, the AAQC was set at 1/10 the TLV. It has been reported, since, that therapeutic use of Li salts may result in unusual toxic responses such as neuromuscular, CNS, cardiovascular, and gastrointestinal changes, as well as renal damage. Based on this information, and although the current AAQC could provide adequate protection against acute local effects (a 1 hour-based value should be suggested in this case, anyway), the relationship between the current AAQC and possible chronic effects should be addressed

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Mercury 7439-97-6	H	2	1974	IP[EPA] AGC[2]: 0.3 SGC[2]: 12	1 for indoor air (this is not a multi- media guide- line)	0.3 Hg and its forms 30/acute NS, KID, LIV		50 as Hg Hg vapor TWA NS 100 as Hg aryl and inorganics TWA NS					18	6.7[NYSDEC /CA]	NO	C	No adequate information was available to judge the relevance of Hg air guidelines summarized in this table. Consequently, the most relevant air guideline could not be identified. EPA is currently reviewing the RfD and RfC for organic and inorganic Hg and this information should be available in the near future. Meanwhile, the most stringent guideline reported was the NYSDEC AGC (0.3 ug/m³), a value similar to the CA guideline. Both are based on the former EPA values (currently being reviewed). On the other hand, the AAQC was 1/25 of the TLV of 50 ug/m³ set to prevent NS effects, thus giving a AAQC/MR ratio of 6.7, indicating that the AAQC does not depart excessively from NYSDEC and CA values. However, Hg is an ubiquitous compound and dietary intake is an important route of exposure. The actual AAQC value for Hg, including organic Hg, should be reviewed for multimedia exposure
Mercury (as Hg) - alkyl compounds 7439-97-6	H TER	0.5	1970	IP[EPA] AGC[6]: 0.024 SGC[2]: 1		see Hg		10 as Hg TWA NS					22	21[NYSDEC]	NO	C	The AAQC was 1/20 of the TLV of 10 ug/m³. NYSDEC AGC was also based on the ACGIH TWA. For comments see above

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	Cl	Comments
Methanol 67-56-1	H	28000	1971	1750[3] LIV/NS		620 TLV- Based		260000 ACU	7.13	SYS EPA	ORAL A	SUB	21	16[EPA]	YES	C	No rationale was provided for setting the AAQC. CA and MASS values were based on the TLV: CA was the TLV divided by an UF of 420, while the calculation of the MASS value was not specified (UF corresponds to ≈31000). It should be noted, however, that the rationale supporting the ACGIH TLV is weak as it was based on an outdated NIOSH report (1976) and the supporting observations in humans were published between 1932 and 1965. Although based on a bioassay, the estimated EPA's RfC may be more relevant as it identifies specific liver and nervous system effects in rats (increased SAP and SGPT, and decreased brain weight, respectively) sub-chronically exposed to methanol as compared to the erratic acute effects observed in humans. Based on these observations, and considering that a AAQC/MR ratio of 16 is not excessively high for an environmental contaminant of low priority, it is suggested that a scientifically defensible rationale for methanol be prepared including the most recent data. The AAQC value should also be reviewed based on recent EPA data
Nitrogen oxides (as Nitrogen dioxide) 10102-44-0	H	200 400 (1h)	1974	IP	150 400/1h	20		5600					18			D	This class of compounds is currently under review by a federal/provincial expert panel

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Pentaborane 19624-22-7	H	1	1970					13 NS		SYS	INHL A	SUB	22	32[3]	YES	C	No relevant rationale was provided due to the lack of toxicological information. Based on a sub-chronic study in monkeys and dogs, significant effects on the NS were observed, which served as a basis for TLV setting. No information on this computation, however, is provided by ACGIH. Due to the seriousness of the effect, the TLV was divided by an UF of 420 for the current comparative review thus resulting in a AAQC/MR ratio of 32. However, due to the fact that pentaborane is unstable in the environment and is not considered a high-priority environmental contaminant, it was classified in group C for review-up-date

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Phenol 108-95-2	KID	100	1985	600[9] TER SGC[2]: 4500 AGC[2]: 9.6		45 TLV- Based		19000 SYS					7			B	The AAQC was based on a 1976 (Dow Chemicals) sub-chronic study in rats and was calculated by dividing the observed LOAEL for kidney effects with an UF of 500 (a 30% contribution from air was considered). However, it is our opinion that the UF should be of 10,000 (a 10-fold factor each for: interspecies, intraspecies, sub-chronic to chronic, and LOAEL to NOAEL). This indicates the high uncertainties associated with the Dow study. The US EPA based its RfD on a 1983 NTP teratology study in rats (never cited in the 1985 AAQC rationale), giving an estimated RfC of 600 ug/m³. Values from NYSDEC, MASS, and CA are more stringent being of 9.6, 52.3, and 45 ug/m³, respectively. Due to the wide range of values (9.6-600 ug/m³) and possible portal-of-entry effects induced by phenol in the pulmonary tract, no relevant value was identified for comparison purpose. As phenol is considered an important environmental contaminant, it is suggested that this compound be appropriately reassessed

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Phosgene 75-44-5	IRR	45	1975	SGC[2]: 95 AGC[2]: 0.95		12 1h value IRR		400 IRR		SYS	INHAL H?	?	17	47[NYSDEC]	NO	B	The AAQC was 1/10 the TLV set to prevent irritation although ACGIH indirectly recognizes that chronic irreversible pulmonary changes such as emphysema and fibrosis may occur at this air concentration as a result of pulmonary adaptive mechanisms. The NYSDEC value was based on the TLV divided by an UF of 420 to take into account these systemic effects and as such was retained for comparison purposes (AAQC/MR = 47). Due to the nature of the end-point and ubiquity of this chemical in the environment, a reassessment is recommended in order to provide adequate permissible levels to protect against short- (1h value) and long-term (24h value) effects
Silver 7440-22-4	H	1	1975	18[5] SKN				10 SKN		SYS	I.V. H	SUB	17	0.06[EPA]	NO	D	The AAQC was 1/10 of the TLV for soluble Ag compounds set to prevent argyria (a bluish-gray discoloration of the skin and mucosa). The EPA set its RfD on this same effect and suggests a value of 5 ug/kg/day which translate into an estimated RfC of 18 ug/m³. As the effects reported by both the OMOE (ACGIH) and EPA are similar, and given an AAQC/MR ratio of 0.06 suggesting an adequate margin of protection, the current AAQC value should remain unchanged

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[2] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Tellurium - excluding hydrogen tellurium 13494-80-9	H	10	1975					100 H					17	1	NO	D	Very little data is available on the possible effects induced by Te. The most frequently reported observation is the presence of "garlic breath" in individuals exposed to this compound. No signs of adverse effects have been reported. The AAQC was set at 1/10 of the TLV for Te and its compounds (but not TeH_4). No other information is available from the most updated databases of regulatory agencies. It is recommended, therefore, that the current AAQC value remains unchanged
Tin 7440-31-5	PUL	10	1975					2000 PUL					17	2[3]	NO	D	The 1975 AAQC was 1/200 the ACGIH TLV for inorganic Sn (as Sn) set to prevent stannosis (a benign pneumoconiosis with no fibrosis but associated with the development of dyspnea). The ACGIH value was based on observations in humans. No other information is available from the most updated databases of regulatory agencies. As the AAQC/MR ratio is relatively low, it is recommended that the current AAQC value remains unchanged

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Toluene diisocyanate 584-84-9	PUL	0.5	1970	SGC[3]: 3.5 AGC[3]:.062 CARC		0.095 PUL		40/TWA 150/STEL	0.1	IRR SYS ACGIH	INHL A/H	ACU /SUB	22	5.3[TWA]	NO	D	An extensive summary document on the health effects induced by TDI in workers was provided by the ACGIH in their guideline manual. Their rationale, and TLV-TWA, served as a base for the setting of guidelines by regulatory agencies (CA, MASS). The OMOE AAQC was 1/300 the ACGIH TLV set to prevent pulmonary effects such as sensitization, tracheobronchitis, inflammation (following irritation), and decreased ventilatory function. Although an UF of 420 would have been more appropriate to better account for possible systemic and long-term pulmonary effects, an AAQC/MR ratio of 5.3 is within of what can be considered as a safe range ($\leq$ 10), when one takes into account uncertainties associated with the reported observations. It is suggested, therefore, that the actual AAQC remains unchanged until information suggesting the development of a more stringent guideline becomes available

Chemical Name CAS #	LE	AAQC 24 hr $\mu g/m^3$	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Trichloroethane, 1,1,1- 71-55-6	ANH	115 mg	1971	IP[EPA] SGC[2]: 450 mg AGC[2]: 1000		320 Chronic 190 mg Acute CNS		1900 mg/TWA 2450 mg/STEL ANH	1038	?	?	?	21	115 NYSDEC	?	B	According to the information available, methyl chloroform may be considered as having a low acute toxicity and no information related to chronic health effects was identified. The AAQC was set at 1/17.5 of the ACGIH TLV-TWA, a value that remains unchanged today (350 ppm/1900 mg/m^3). No rationale for this computation was reported, although the effects it was aimed at preventing were likely related to anesthesia. The long-term CA value (based on the former EPA's RfD: withdrawn and currently under review) and the NYSDEC AGC both suggest the possibility of chronic effects. It is recommended, therefore, that the rationale for methyl chloroform be reviewed to include such considerations. Due to the high AAQC/MR ratio (115), and to uncertainties related to the end-points of interest, this compound was classified "B"
Trifluorotrichloroethane 76-13-1	H	none														D	The status should remain unchanged as this class of substances is governed by Part-V of the Environmental Protection Act. Under review by OMOE for CFC Regulation

Chemical Name CAS #	LE	AAQC 24 hr µg/m³	Date	EPA (EP)	WHO (EP)	CA (EP)	FDA (EP)	OEL[7] (EP)	MASS (EP)	Irr/ Syst[1]	Inhl/ Oral H A[1]	Sub/ Chr[1]	T	AAQC/ MR	LE/EP	CI	Comments
Vanadium 7440-62-2	PUL	2	1974	II[EPA] SGC[2]: 100 AGC[2]: 0.2				50 as V_2O_5 PUL	0.27	SYS	INHL A/H	ACU /SUB (?)	18	10[NYSDEC]	NO	C	The AAQC was 1/25 the ACGIH TLV-TWA set to prevent pulmonary effects reported to be tracheitis, bronchitis, emphysema, and, under certain circumstances, pulmonary edema. However, the current ACGIH rationale, which still support the 50 ug/m³ TWA, clearly states that this value was developed based on the acute effects observed in 5 human volunteers. It is uncertain, therefore, whether chronic effects may be accounted for with the current AAQC. Lower permissible levels are proposed by NYSDEC and MASS. However, the NYSDEC rationale was not available for consultation at the time of this review. Although the AAQC/MR ratio between OMOE AAQC and NYSDEC AGC is relatively low, and despite the fact that EPA is actually reviewing the toxicology of Va to propose an RfD/RfC, it is recommended that the current value should be reviewed/up-date in view of the environmental ubiquity of this metal

GENERAL ABBREVIATIONS USED IN TABLE C1

ADI	allowable daily intake
ASP	asphyxiation
ANA	analgesic
ANH	anesthesia
BAT	best available technology
BL	blood changes
CA	regulated by the State of California
CV	cardiovascular effects
D	dust
GI	gastrointestinal effects
H	health effects (general, when non specified)
HEM	hematological effects
IMM	immunological effects
IP	review in progress
IRR	irritation
KID	kidney effects
LIV	liver effects
NS	nervous system effects
OCC	ocular effects
POI	point of impingement
PUL	pulmonary effects
RESP	respiratory effects
REP	reproductive effects
ROE	rate of emission
SYS	systemic effects (nature not specified)
SKN	skin effects
TER	teratogenicity
THY	thyroid effects
TP	total particulates
TLV	threshold limit value
TRA	tranquilizer
STEL	short-term exposure limit
WGT	weight change or reduced growth
?	requires verification

TABLE HEADINGS

LE	Limiting effect
AAQC	is in ug/m^3 and for 24 hours unless otherwise stated (e.g., mg is for mg/m^3)
Date	year of proposal
EP	End-Point
Time	time in years elapsed since proposal

Inhl	inhalation
H	humans
A	animals
Sub	sub-chronic
Chr	chronic
CI	requirements for review/assessment/standard setting; A: it is proposed that the interim standard becomes a standards; B: substantial reduction and/or reassessment; C: review; D: unchanged status (for details see text)

[1]Pertains to the study used by the regulatory agency to develop the environmental standard/guideline retained for comparison purpose (EPA, CA, etc.); when no environmental and occupational standards were identified in the literature, information reported under [1] pertains to studies retained by ARB/OMOE for AAQC development

[2]As per New York State Department of Environmental Conservation (NYSDEC, 1991)

[3]AAQC was divided by TLV/420, where 420 is the uncertainty factor: 4.2 (to extrapolate from a 40 hour work week to a 168 hour full week) times 10 (to extrapolate from healthy workers to sensitives) times 10 (since adverse health effects are often seen at the TLV's)

[4]AAQC was divided by NIOSH PEL/420, where 420 is the uncertainty factor: 4.2 (to extrapolate from a 40 hour work week to a 168 hour full week) times 10 (to extrapolate from healthy workers to sensitives) times 10 (since adverse health effects are often seen at the TLV's)

[5]RfC was estimated from the US EPA RfD by assuming that a 70 kg adult breaths 20 m^3 of air per day

[6]RfC was estimated from the WHO ADI by assuming that a 70 kg adult breaths 20 m^3 per day

[7]OEL (Occupational Exposure Limits) are generaly reported for a work period of 40 hours per week, unless otherwise stated

APPENDIX F

LIST OF STANDARDS BASED ON EFFECTS OTHER THAN HEALTH

TABLE F

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies Guidelines				Description of Study used as basis of Other Agency Guideline (most relevant)				Time Elaps (Yrs)	Comparison of Other Agency and Health-based OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[3] RfD $\mu g/kg/d$ —— $\mu g/m^{3(6)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(7)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Acetic acid 64-19-7	O	2500 (24hr) 1970		-	-	-	25000 —— 2500	-	Human ACGIH	Inhl	Acu	Irr, eye, nose, throat	22	1 (2500/ 2500) ACGIH	NO	C	Acetic acid is used in the manufacture of pharmaceuticals and as a food additive. No ARB health-based rationale is available. However, the current AAQC based on odour is considered protective for irritative effects as it compares to the corrected TLV-TWA for corresponding effects. A 1 hour-based value is recommended and a defensible health-based rationale should be provided. The TLV is under review.
Acetone 67-64-1	O	48000 (24hr)[14] 1975		237000 TLV based 1975	100 —— 350	-	1780000 —— 178000 Human, Inhl, Acu, Irr, eye, nose, throat	160.54	Rat EPA	Oral	90 day	Sys Inc liver, kidney weight, kidney damage	17	677 (237000/ 350) EPA	YES	C	The AAQC is based on the previous ACGIH TLV of 2370000 $\mu g/m^3$ divided by an uncertainty factor of 10. The TLV was lowered in 1979 to the present value. Also, NTP has conducted long term toxicology and drinking-water cancer studies but results have not been published yet. Based on long-standing evidence in industrial setting, however, the most relevant effect caused by acetone seems to be irritation. As the current odour-based AAQC is adequately protective against irritation, that EPA has low confidence in the RfD, and that the outcome of more appropriate studies (NTP) is still unknown, it is recommended that the current health-based AAQC for acetone remains unchanged. However, a 1 hour-based value for irritation should be proposed, and this does not require detailed knowledge of NTP results. Consequently, this compound was classified "C" for review/up-date

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies Guidelines				Description of Study used as basis of Other Agency Guideline (most relevant)				Time Elaps (Yrs)	Comparison of Other Agency and Health-based OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(c)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Boron trichloride 10294-34-5	C		35 1970	-	-	-	-	-					22			C	For boron halides it was decided that the toxicity was due to the presence of halide and not boron. Hydrolysis of boron halides releases the halide and the AAQC for boron tribromide was adopted for boron trichloride. However, consideration should have been given to by-products such as chlorine and hydrogen chloride for which permissible values were available. Examination of the AAQCs for these compounds gives values of 150 ug/m^3 (24 hour value for health effects) and 40 ug/m^3 (1 hour value for corrosion), respectively. It is concluded, therefore, that although the current rationale may not be adequate to support the AAQC for boron trichloride, the AAQC number itself is considered adequately protective for health effects, although the most sensitive limiting effect in this case appears to be corrosion for which this 24 hour value was proposed. It is recommended, therefore, that the current compound be classified as C on the ground that no relevant rationale is available to support the current number, and that a summary of health effects should be prepared

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ ——— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ ——— $\mu g/m^{3(7)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Boron trifluoride 7637-07-2	Veg		2 1970	150 TLV based 1970	-	-	2800 ——— 280	-	Animal ACGIH	Inhl	30 day	Irr lung	22	0.01 (2/280) ACGIH	YES	C	For boron halides it was decided that the toxicity was due to the presence of halide and not boron. Hydrolysis of boron halides releases the halide. It was recommended that boron trifluoride should be treated as a source of fluoride. Therefore, the fluoride 1/2 hour Point of Impingement limit (based on effects on vegetation) was used to determine the boron trifluoride AAQC of 2 $\mu g/m^3$. On the other hand, the health-based AAQC was derived from the TLV for boron trifluoride (TLV-Ceiling) divided by an uncertainty factor of 20. For comparison purposes, the TLV-Ceiling for hydrogen fluoride and fluorine is 2600 ug/m^3 and 1600 ug/m^3, respectively. It is concluded, therefore, that the current 24 hour-based AAQC set to prevent effects on vegetation is considered adequate to prevent acute local health-based effects as well and, consequently, should remain unchanged. However, a review of the rationale to include these considerations is recommended
Calcium hydroxide 1305-62-0	C		13.5 1970	-	-	-	5000 ——— 500	-					22	0.03 (13.5/ 500) ACGIH	YES	D	The AAQC rationale is unavailable. Exposure to calcium hydroxide results in severe irritation of the eyes, respiratory tract, and skin. The TLV for calcium hydroxide is 2.5 times greater than the TLV for sodium hydroxide because of favourable industrial experience, absence of reports of adverse health effects from exposure, and the fact that alkaline earth hydroxides are less alkaline than alkali series hydroxides. As the actual AAQC/MR ratio based on the 24 hour AAQC value for corrosion is assumed to be adequate against acute local effects, it is recommended that the actual value should remain unchanged

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[1] RfD $\mu g/kg/d$ —— $\mu g/m^{3(a)}$	CA[2] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(n)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Calcium oxide 1305-78-8	C		10 1970	-	-	-	2000 —— 200	-					22	0.05 (10/200) ACGIH	YES	D	The exact derivation of the AAQC was not specified. The AAQC is apparently based on a study conducted in Oregon in which it was determined that 10 $\mu g/m^3$ of calcium oxide in the air was not objectionable to the populace. Exposure to calcium oxide results in severe irritation of the eyes, skin, and respiratory tract. The TLV for calcium oxide is based on analogy with sodium hydroxide and by comparison with calcium hydroxide which is less irritating. As the current 24 hour-based AAQC value set to prevent corrosion is adequately protective against irritating effects, it is recommended that the value remains unchanged
Carbon black 1333-86-4	S		10 1987	TSP 1987	-	-	3500	-					5	0.003 (10/ 3500) ACGIH	YES	D	The exact derivation of the AAQC was not specified. Specific data on the soiling effects of carbon black is not given. Because of a lack of compelling evidence that carbon black in the air adversely affects human health, application of the TSP standard was suggested in 1987 as part of the health effects assessment. The TLV is set at 3500 $\mu g/m^3$ to minimize complaints of excessive dirtiness. As no further information on the potential health effect induced by carbon black is available from regulatory agencies, and in view that this compound is not considered as a priority pollutant, the AAQC value should remain unchanged until new information becomes available

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[3] RfD $\mu g/kg/d$ ——— $\mu g/m^3$[6b)]	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ ——— $\mu g/m^3$[7)] and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Carbon disulphide 75-15-0	O	330 (24hr) 1970		-	100 / 350	-	31000 / 3100 Human, Inhl, Occ[15], cardio-vascular effects	-	Human WHO	Inhl	Occ[15]	Sys sensory poly-neuritis and inc pain thres-hold	22	3.3 (330/ 100) WHO	YES	D	The AAQC rationale is based on odour; an ARB health-based rationale does not exist. The EPA has medium confidence in the RfD but the RfD is under review. The RfC is also pending review by EPA. No effects were observed in EPA principal study, a rabbit inhalation teratology study (36-week exposure duration), used as the basis for the RfD. In another supporting study, fetal resorptions were observed in rabbits. The WHO[16] recommends a health-based air guideline of 100 $\mu g/m^3$ for a 24-hour averaging time. The WHO guideline is based on the lowest-observed-adverse-effect level of 10000 $\mu g/m^3$ (divided by an uncertainty factor of a 100) which caused sensory polyneuritis and an increased pain threshold in humans in a occupational setting. The TLV is also under review because cardiovascular and central nervous system effects have been observed at 31000 $\mu g/m^3$. NTP has conducted subchronic inhalation toxicology and inhalation teratology studies on carbon disulphide and is currently reviewing these studies. The current odour-based AAQC is comparable to the WHO value and should, therefore, provide adequate protection against the above mentioned health effects. Furthermore, EPA, ACGIH and NTP are reviewing their supporting data and any change to the current AAQC for carbon disulphide should await further information. Thus, the current value should remain unchanged

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3(c)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Acetylene 74-86-2	O	56000 (24hr) 1970		odour 1970	-	-	-	-								D	Exposure to acetylene has a narcotic effect at high concentrations and, consequently, this compound is classified as a simple asphyxiant by the ACGIH. It is considered to be relatively non-toxic. The reviewer of the health effects recommended that the AAQC should be based on odour. The current odour-based AAQC is significantly lower than current OELs, especially NIOSH REL ceiling limit set to prevent explosion and flammability hazard. The value should remain unchanged
Ammonia 7664-41-7	O	3600 (24hr) 1970		-	100 RfC	100 RfC based	17000 / 1700 Human, Inhl, Acu, Irr, eye, nose, throat	4.73	Human EPA	Inhl	Occ[13]	IRR (RESP) no effect	22	36 (3600/ 100) EPA	NO	C	No ARB health-based rationale is available. EPA derived its RfC from human studies (workers) and has medium-to-high confidence in the database and medium confidence in the RfC. The response obtained is mainly related to the extrathoracic region and, consequently, involves irritation of the upper respiratory tract. As a RfC is available, it should be used for AAQC setting. Furthermore, as systemic effects are unlikely, a shorter exposure period (1 hour-based value) should be considered

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^3$[res]	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^3$[ACT] and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Boron 7440-42-8	P		120 1988	TSP 1970	90 / 315	-	-	-	Dog EPA	Oral	2 year	Sys no effect	22	0.38 (120/ 315) EPA	YES	C	Since boron compounds such as boron oxide (TLV of 15000 $\mu g/m^3$ in 1970) are relatively non-toxic, it was recommended that the TSP standard be used to control boron emissions. At present, the TLV for boron oxide is 10000 $\mu g/m^3$. However, ACGIH reports that boron oxide reacts exothermically with water to form boric acid, an irritant whose 1 hour-based AAQC (88 ug/m^3) was judged adequate to prevent acute effects. As the current 24 hour-based AAQC value for boron (120 ug/m^3 as boron oxide) is considered adequately protective to prevent irritation, the only suggestion is that this value be reviewed to provide a shorter exposure period of 1 hour
Boron tribromide 10294-33-4	C		35 1970	500 TLV based 1970	-	-	10000 / 1000		The TLV derivation is based on the analogy of boron tribromide to hydrogen bromide with respect to irritation effects. (Hydrogen bromide is a decomposition product of boron tribromide.)				22	0.4 (35/ 1000) ACGIH	YES	C	Hydrolysis of boron halides releases the halide. It was recommended, therefore, that boron tribromide should be treated as a source of bromine and, consequently, the bromine standard, based on health, was used to calculate an AAQC for boron tribromide of 35 $\mu g/m^3$ to prevent corrosion. The health-based AAQC was derived from the TLV divided by an uncertainty factor of 20 thus giving a value of 500 ug/m^3. This, however, is substantially higher than the current AAQC values for bromine (24 hour; 20 ug/m^3) and hydrogen bromide (1 hour; 668 ug/m^3), both set to prevent irritation. Consequently, the actual value of 35 ug/m^3 set to prevent corrosion is also considered adequate to prevent irritative effects that may occur either from hydrogen bromide and bromine. A review of the rationale to include these considerations is recommended

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[3] RfD $\mu g/kg/d$ —— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(7)}$ and EP	MASS AAL[3] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Chlorine 7782-50-5	H + Veg		150 (24hr) 1970	-	-	7.1 TLV based	1500 / 150	3.95	Human ACGIH	Inhl	Acu	Irr, eye, nose, throat	22	1 (150/ 150) ACGIH	NO	C	The AAQC rationale was based on various criteria such as other agency guidelines, the TLV from USSR, the dose at which vegetation damage occurs, and the OMOE hydrogen chloride guideline. Although the current AAQC could be considered adequate to prevent acute effects, there is evidence that the ACGIH TLV is a human LOAEL and, therefore, an uncertainty factor of 10 may not be adequate (as suggested by MASS and CA values). Furthermore, the AAQC should be reviewed to provide a 1 hour-based value as chlorine is considered to be a non-cumulative and environmentally unstable contaminant
Dicapryl phthalate 131-15-7	P		120 1988	500 TLV based 1970	-	-	-	-					4			B	Because of the lack of toxicity data on dicapryl phthalate, the health-based AAQC was derived from the TLV of 5000 $\mu g/m^3$ for di(2-ethylhexyl)phthalate (DEHP). DEHP has been classified as a probable human carcinogen by US EPA. It was thought that the toxicity of dicapryl phthalate was probably of the same order as DEHP. The TLV was divided by an uncertainty factor of 10. Since the health-based 24-hour AAQC is greater than the particulate standard it was decided to restrict the 24-hour AAQC to the TSP standard. Due to these uncertainties, the AAQC and the corresponding rationale should be reassessed for chemical-specific data (if available in the primary literature), evidence of carcinogenicity of the surrogate chemical (DEHP) and the potential consequences of this finding on the activity of dicapryl phthalate, and SAR based on more relevant chemicals, if any

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ ——— $\mu g/m^{3(6)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ ——— $\mu g/m^{3(7)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Dimethyl disulphide 624-92-0	O	40 (1hr) 1970		-	-	-	-	-					22			D	The AAQC rationale is based on odour. No ARB health-based rationale exists and no adequate information was available from secondary sources. NYSDEC[12] proposed an SGC of 39 ug/m³ and a AGC of 24 ug/m³, based on SAR, set to prevent health-effects. The current AAQC should therefore remain unchanged
Dimethyl sulphide 75-18-3	O	30 (1hr) 1970		-	-	-	-	-					22			D	The AAQC rationale is based on odour. No ARB health-based rationale exists and no information was available from secondary sources. Similarity between dimethyl sulphide and dimethyl disulphide suggests that the current AAQC should remain unchanged until new info becomes available
Dioctyl phthalate 117-84-0	P		120 1988	500 TLV based (invalid) 1970	-	-	-	-					4			B	The health-based 24-hour AAQC of 500 $\mu g/m^3$ that was developed, in 1970, for di(2-ethylhexyl)phthalate (DEHP), CAS # 117-84-0, was mistakenly assigned to dioctyl phthalate, CAS # 117-84-0. (Dioctyl phthalate is straight-chain isomer of DEHP, which is a branched-chain phthalate ester. DEHP has been classified as a probable human carcinogen by US EPA.) At that time it was decided that the limiting factor in setting the AAQC would be the TSP standard (24-hour AAQC of 120 $\mu g/m^3$) because it was more stringent than the health-based 24-hour health-based AAQC of 500 $\mu g/m^3$. At present, an ARB health-based rationale does not exist for dioctyl phthalate. Based on these uncertainties, it is suggested that the AAQC and its corresponding rationale be appropriately reassessed

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^3$[6&6]	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^3$[6&7] and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Dustfall N A	S		7 g/m^2, 30 day average, 4.6 $\mu g/m^2$ annual arithmetic mean 1970	-	-	-	-	-					22			C	The criteria used for the basis of the AAQC was the unacceptable deposition of visible dust on clean surfaces around the home. It appears that the 7 g/m^2 for 30 day average was derived from air pollution data measured in Ontario between 1954-1955. Specifically, it would seem that data from the low end of a range of data measured in low air pollution areas was used. As it is conceivable that changes in pollution levels may have occurred since, and that other considerations could be factored into this rationale, a review/up-date is recommended
Ethyl acetate 141-78-6	O	19000 (1hr) 1970		-	900 —— 3150	-	1440000 —— 144000 Human, Inhl, Acu, Irr, eye, nose, throat	391.84	Rat EPA	Oral	90 day	Sys dec body weight, dec food intake	22		YES	C	Ethyl acetate has a fruity odour and is added to foods. The AAQC rationale is based on odour and no ARB health-based rationale exists. Although EPA has low confidence in the RfD, its value as well as MASS AAL suggest that possible health effects should be considered in developing an AAQC for ethyl acetate. Based on the values provided by these agencies, these health effects are likely to occur at lower levels than the odour threshold. Although a 1 hour-based value for odour is relevant, a review/up-date is suggested to take into account potential health effects

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(n)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Ethyl benzene 100-41-4	O	4000 (1hr) 1975		43500 appears to be based on TLV 1975	1000 RfC	-	434000 —— 43400 Human, Inhl, Irr, eye, nose, skin	-	Rat, Rabbit EPA	Inhl	ges-tation day	Sys dec litter size in rabbits, skeletal effects in rat fetuses	17	44 (43500/ 1000) EPA	YES	B	The limiting factor used in the setting of the AAQC is odour. It appears that the health-based AAQC was derived from the TLV divided by an uncertainty factor of 10. As EPA has proposed an RfC for reproductive and teratogenic effects at air concentrations substantially lower than the current health-based AAQC, a reassessment is recommended. However, a 1 hour-based value for odour is considered relevant to prevent nuisance from this compound and should be maintained following appropriate review of new values related to the odour threshold for this chemical
Ferric oxide 1309-37-1	S		25 1970	25 TLV based 1985	-	-	5000 —— 500 ferric oxide fume (measur-ed as iron)	-	Human ACGIH	Inhl	Occ[13]	Irr sider-osis	22	0.05 (25/500) ACGIH	YES	D	The limiting factor used in the setting of the AAQC is soiling effects. Specific data on the soiling caused by ferric oxide is not given. However, the soiling effect is based on the maximum emission of 100 $\mu g/m^3$ of particulate from steel operations (approximately 75% ferric oxide). This gives a ½ hour POI Limit of 75 $\mu g/m^3$. The AAQCs for soiling and health effects are similar, giving an AAQC/MR ratio of 0.05. For ferric sulphate, NYSDEC[12] proposes a SGC and AGC of 89 and 890 ug/m^3, respectively, based on SAR. Therefore, the current AAQC value is considered adequate to protect from soiling and potential health effects

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	LE	Odour based values µg/m³	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values µg/m³	Health effects based values µg/m³ and EP	EPA[2] RfD µg/kg/d ——— µg/m³[eq]	CA[3] accept exp limit µg/m³	ACGIH TLV-TWA[4] µg/m³ ——— µg/m³[eq] and EP	MASS AAL[5] µg/m³	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Fluoridation (total) - growing season 7664-39-3	Veg		40 µg/m³/100 cm²/30 days 1974	-	60 ——— 210 as soluble fluoride	5.9 TLV based	2600 ——— 260 as fluoride, Human, Inhl, Occ[15], Irr, no effect	6.8	Human (child) EPA	Oral	Epi-demi-ology	Sys objec-tion-able dental fluoro-sis (cos-metic)				C	The AAQC for fluoride emissions are broken down into three major categories: 1) fluoridation, for the growing season and nongrowing season, which is measured as µg of total fluorides collected over a 30 day period; 2) fluorides-gaseous, for the growing season and fluorides-gaseous and particulate, for the growing season and the nongrowing season, measured in 30 day intervals in µg/m³; and 3) fluorides in forage, measured as ppm dry weight for periods of a single month, an average of two consecutive months and an average of monthly results for the growing season. The 24-hour AAQC for gaseous fluoride of 0.86 µg/m³ is based on results available from the literature at the time; the AAQC for fluorides in forage is based on protection of animal health. No ARB health-based rationale exists. It is recommended, therefore, that health-based information pertaining to fluorides should be reviewed in view of the ubiquity of this class of compounds in the environment and the possible human health effects associated with their exposure (*e.g.*, fluoridation, osteoporosis, NTP study on carcinogenicity)
Fluoridation (total) - nongrowing season 7664-39-3	Veg		80 µg/m³/100 cm²/30 days 1974														
Fluorides (gaseous, as Hydrogen Fluoride (HF)) - growing season 7664-39-3	Veg		0.86 (24 hr), 0.34 (30 days) 1974														
Fluorides - total (gaseous and particulate as HF) - growing season 7664-39-3	Veg		1.72 (24 hr), 0.69 (30 days) 1980														
Fluorides - total (gaseous and particulate as HF) - nongrowing season 7664-39-3	Veg		3.44 (24 hr), 1.38 (30 days) 1980														

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3(6)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3(7)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Fluorides in forage 7664-39-3	H		80 ppm dry weight/30 day average, 60 ppm dry weight/60 day average, 35 ppm dry weight/30 day average in growing season 1980														
Furfural 98-01-1	O	1000 (1hr)[14] 1975		1000 appears to be based on the TLV 1973	3 / 10	-	7900 / 790 Human, Inhl, Occ[13], Irr, eye, nose, throat	-	Rat EPA	Oral	13 week	Sys, mild liver effects	17	100 (1000/ 10) EPA	YES	B	The limiting factor used in the setting of the AAQC is odour. It appears that the health-based AAQC was derived from the TLV divided by an uncertainty factor of 8 although no reason was given for such procedure. EPA has low confidence in the RfD, and an RfC is pending review. Due to the high AAQC/MR ratio, it is recommended that the rationale for the health-based AAQC be reviewed as it may take precedence over the odour-based value

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[3] RfD $\mu g/kg/d$ ——— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ ——— $\mu g/m^{3(n)}$ and EP	MASS AAL[3] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Hydrogen chloride 7647-01-0	C		40 Date N/A	-	7 RfC	-	7500 ——— 750 Human, Inhl, Acu, Irr	2.03	Rat EPA	Inhl	2 year	Sys hyper-plasia of larynx, trachea and nasal mucosa	-	6 (40/7) EPA	YES	C	On the basis of experience in industry, the 24-hour AAQC of 40 $\mu g/m^3$ was considered to be the maximum acceptable concentration from the standpoint of corrosion. Specific data on the corrosion caused by hydrogen chloride was not given. A health-based rationale written in 1988 compared the corrosion-based AAQC to the TLV and concluded that the AAQC is protective of health. However, it is recommended that the current AAQC be reviewed in view of the EPA RfC based on a 2 year inhalation bioassay in rats that reported upper respiratory tract effects. Furthermore, the rationale should discriminate between hydrogen chloride and hydrochloric acid, the resultant chemical formed by the dissolution of the gas in aqueous medium (mucosa). A "C" classification was attributed based on a AAQC/MR ratio of 6
Hydrogen sulphide 7783-06-4	O	30 (1hr) 1970		-	0.9 RfC	42	14000 ——— 1400 Human, Inhl, Occ[15], conjunc-tivitis	3.79	Mouse EPA	Inhl	90 day	Irr inflam-mation of nasal mucosa	22			C	The limiting factor used in the setting of the AAQC is the odour threshold. No ARB health-based rationale exists. The WHO[16] recommends a health-based air guideline of 150 $\mu g/m^3$ for an averaging time of 24 hours. The WHO guideline is based on the lowest-observed-adverse-effect level of 15000 $\mu g/m^3$ (divided by an uncertainty factor of 100) which causes eye irritation in humans. The California guideline of 42 $\mu g/m^3$ is a 'California Air Quality Standard'. EPA has medium confidence in the RfC. Due to pressure resulting from public complaints regarding the odorous properties of this chemical, a review/up-date is recommended for more stringent values

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(7)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Iron-metallic 15438-31-0	S		4 1975	4 TLV based 1985	-	-	5000 —— 500 ferric oxide fume (measured as iron)	-	Human ACGIH	Inhl	Occ[13]	Irr sider-osis	17	0.008 (4/500) ACGIH	YES	D	On the basis of discussion with experts in the field, the 24-hour AAQC of 4 $\mu g/m^3$ is considered to be the maximum acceptable level from the standpoint of soiling, specifically the prevention of rust spotting on painted surfaces. Some specific soiling data for iron dust is available. The health-based AAQC was derived from the TLV, for ferric oxide fume (measured as iron), divided by an uncertainty factor of 1250. This value is considered adequately protective (see comments for ferric oxide). It is recommended that the current AAQC value for health effects remains unchanged
Magnesium oxide 1309-48-4	P		120 1988	100 appears to be based on the TLV 1971			10000 —— 1000 magne-sium oxide fume						4	0.12 (120/ 1000) ACGIH	NO	D	Magnesium oxide, as a powder, is used in pharmaceuticals and in food additives. The limiting factor used in setting the AAQC is the TSP standard. The reason for the selection of the of the TSP standard as the basis for the regulation of magnesium oxide emissions is that if health effects (24-hour AAQC of 100 $\mu g/m^3$) had been chosen as the limiting factor then the equivalent ½ hour POI Limit would be 300 $\mu g/m^3$ (100 $\mu g/m^3$ * 3). However, the TSP standard (½ hour POI Limit of 100 $\mu g/m^3$) is more conservative (relying on the over-riding effect of the existing TSP standard) and would result in lower emissions. It appears that the health-based AAQC was based on the previous TLV of 15000 $\mu g/m^3$, divided by uncertainty factor of 150. ACGIH regulates magnesium oxide as a nuisance particulate. The current AAQCs for both health and nuisance effects appear to be adequate for this compound

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3[a]}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3[c]}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Mercaptans (as Methyl mercaptan) - total 74-93-1	O	20 (1hr) 1970		-	-	-	-	-					22			C	The AAQC rationale is based on odour. No ARB health-based rationale exists. This class of compounds is generally regulated based on their odour potential. Should remain unchanged unless relevant health-based information becomes available. Due to pressure resulting from public complaints regarding the odorous properties of this chemical, a review/up-date is recommended for more stringent values
Methyl acrylate 96-33-3	S	4 (1hr) 1970		700 appears to be based on the TLV 1971	-	-	35000 / 3500	4.79	Animal ACGIH	Inhl	Acu	Irr eye, skin	22	0.2 (700/ 3500) ACGIH	NO	D	Methyl acrylate is used in the preparation of vitamins. The limiting factor used in the setting of the AAQC is odour. It appears that the health-based AAQC was derived from the TLV divided by an uncertainty factor of 50. As the most relevant end-point associated with exposure to methyl acrylate seems to be mucosal irritation, both the health-based AAQC (700 ug/m^3) and the short-term value for odour (4 ug/m^3) are judged adequate to protect against acute local effects. The current AAQC values should remain unchanged
Methyl ethyl ketone 78-93-3	O	31000 (1hr) 1970		-	-	-	590000 / 59000	32.07	Human ACGIH	Inhl	Acu	Irr eye, nose	22			B	The AAQC rationale for methy ethyl ketone (MEK) is based on odour. No ARB health-based rationale exists. The RfD was withdrawn by the EPA and the RfC is pending review. However, MEK is and belongs to a class of organic solvents that have been extensively studied and for which a substantial amount of information is available. Due to the lack of a health-based AAQC and to the potential relevance of this compound as an environmental contaminant a reassessment is recommended to provide at least a provisional value. Odour threshold should also be given consideration

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ ——— $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ ——— $\mu g/m^{3(7)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Methyl methacrylate 80-62-6	S	860 (24hr) 1970		7000 appears to be based on the TLV 1971	-	980 TLV based	410000 ——— 41000	22.27	Human ACGIH	Inhl	Occ[13]	Irr	22	0.2 (7000/ 41000) ACGIH	NO	D	Methyl methacrylate is used in the manufacture of dental restorations and surgical implants. The limiting factor used in the setting of the AAQC is odour. It appears that the health-based AAQC was derived from the TLV divided by an uncertainty factor of 50. The current odour-based AAQC is substantially lower than the health-based AAQC and is comparable to values proposed by CA and Calabrese[13]. It is considered, therefore, satisfactory to prevent irritation which appears to be the most sensitive end-point from a toxicological point of view. It is suggested, therefore, that the current AAQC should remain unchanged
Milk powder N/A	S+O		20 1971	-	-	-	-	-					21			C	The 24-hour AAQC of 20 $\mu g/m^3$ was considered to be the maximum acceptable level from the standpoint of potential odour and soiling in 1971. An odour problem would result from the possible formation of sour milk; and an excessive amount of milk powder on a wet surface has a soiling effect. Specific data with regard to these effects was not given. Although milk powder may not be considered as a priority environmental contaminant, it is suggested that a defensible rationale which supports the current AAQC should be prepared (so that it can be available for consultation!)
Monomethyl amine 74-89-5	O	25 (24hr)[14] 1975		1000 Irr, eye, skin 1971	-	-	-	-					22			C	The limiting factor used in the setting of the AAQC is odour. The exact derivation of the health-based rationale was not specified. Should be reviewed/up-dated

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[3] RfD $\mu g/kg/d$ / $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3(7)}$ and EP	MASS AAL[3] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Nitric acid 7697-37-2	C		35 1970	-	12[2]	-	5200 520	-					22	0.07 (35/520) ACGIH	NO	C	The limiting factor used in the setting of the AAQC is corrosion. It was estimated that nitric acid and hydrochloric acid have comparable corrosion potentials. Therefore the 24-hour AAQC of 35 $\mu g/m^3$ for hydrochloric acid (at the time) was adopted for nitric acid. The basis for the TLV is that irritation from nitric acid would be expected to be equal to that of other strong acids. Therefore, the TLV for nitric acid is in between the TLV for sulphuric acid and hydrogen chloride. The current corrosion-based value of 35 ug/m^3, although not set to prevent health effects, is comparable to the TWA suggested by Calabrese[13] (21 ug/m^3), and to the NYSDEC[12] SGC (12 ug/m^3). Therefore, it is considered adequately protective. However, it is suggested that the rationale should be rephrased to include these considerations

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^3$[6c]	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^3$[7] and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Ozone 10028-15-6	H + Veg		165 (1hr) 1970	-	-	180	200	-					22			D	The AAQC rationale is unavailable. The California guideline of 180 $\mu g/m^3$ is a California Air Quality Standard. The exact derivation of the TLV is not specified. The Canadian Federal Government has set National Ambient Air Quality Objectives (NAAQO) for ozone at three levels. These are: Desirable Objectives of 100 $\mu g/m^3$ (1 hour averaging time) and 30 $\mu g/m^3$ (24 hour averaging time); Acceptable Objectives of 160 $\mu g/m^3$ (1 hour averaging time), 50 $\mu g/m^3$ (24 hour averaging time), and 30 $\mu g/m^3$ (annual average); and a Tolerable Objective of 300 $\mu g/m^3$ (1 hour averaging time). The U.S. Federal Government has set a National Ambient Air Quality Standard[11] of 235 $\mu g/m^3$ for a 1-hour averaging time for ozone. The WHO[10] recommends a health-based air guideline range of 150-200 $\mu g/m^3$ for an averaging time of 1 hour and a range of 100-200 $\mu g/m^3$ for an averaging time of 8 hours. The WHO[10] also recommends air guidelines for ozone based on effects to vegetation. These are 200 $\mu g/m^3$ for 1 hour, 65 $\mu g/m^3$ for 24 hours, and 60 $\mu g/m^3$ for the growing season (100 days). These values are based on the threshold concentrations of ozone that have an effect during the growing season. Ozone has been classified in category 'D' because ozone guidelines are generally set and/or revised as a result of Federal-Provincial reviews, which set out NAAQOs. Ozone is also being reviewed as part of the NOx/VOCs initiative (i.e. S206 initiative). Based on these various considerations, no attempt was made to evaluate the relevance of the current AAQC

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[3] RfD $\mu g/kg/d$ / $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3(7)}$ and EP	MASS AAL[3] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Phosphoric acid (as P_2O_5) 7664-38-2	P		120 1988	200 appears to be based on the TLV 1971	-	-	1000 / 100	0.27	Human ACGIH	Inhl	Occ[13]	Irr, throat	4	1.2 (120/ 100) ACGIH	YES	D	The limiting factor used in the setting of the AAQC is the TSP standard. The reason for the adoption of the TSP standard for phosphoric acid was that it is more conservative than the health-based value. The health-based AAQC appears to be based on the TLV divided by an uncertainty factor of 5; this value, which compares adequately to the TWA proposed by Calabrese[13] (100 ug/m³), is considered adequate to prevent irritation. As the TSP-based value is even more stringent, the current set of AAQCs should remain unchanged
Phthalic anhydride 84-44-9	P		120 1988	500 1970	2000 / 7000	7000 RfD based	6100 / 610	0.82	Mouse EPA	Oral	104 week	Sys lung, kidney lym-phocy-tosis	4	0.017 (120/ 7000) EPA	NO	D	Phthalic anhydride is used in the manufacture of therapeutic drugs. The limiting factor used in the setting of the AAQC is the TSP standard, the reason being its stringency as compared to the health-based value. The exact derivation of the health-based AAQC was not specified. The TLV for phthalic anhydride was based on its relative irritancy to maleic acid anhydride. As the TSP-based value is adequate to protect against potential acute and systemic effects as compared to EPA, CA, and ACGIH values, (Calabrese[13] suggested a TWA of 300 ug/m³ to protect against irritation), the current AAQCs should remain unchanged
Propylene dichloride 78-87-5	O	2400 (1hr) 1975		14000 1973	-	-	347000 / 34700	-	Animal ACGIH	Inhl	Acu, 180 day	acute lethal-ity, no effect	17	0.4 (14000/ 34700) ACGIH	NO	C	The limiting factor used in the setting of the AAQC is odour. The exact derivation of the health-based AAQC is not specified and the ACGIH summary document for this compound briefly summarizes studies from the 1950's. Propylene dichloride is a severe hepatotoxin in rodents. Should be reviewed/up-dated for more relevant health-based effects

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[3] RfD $\mu g/kg/d$ ——— $\mu g/m^3$[(a)]	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ ——— $\mu g/m^3$[(b)] and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Sulphur dioxide 7446-09-5	H + Veg		275 1970		-	660	5200 ——— 520 Human. Inhl. Occ[15]. Sys, pulmonary disease	-					22			D	Sulphur dioxide is used as a food additive. The 24-hour AAQC is based on the combination of sulphur dioxide with particulate matter, resulting in increased admissions of respiratory patients to hospitals and on vegetation damage. AAQCs of 690 $\mu g/m^3$ (1-hour averaging time) and 55 $\mu g/m^3$ (annual average) are also available. The California guideline of 660 $\mu g/m^3$ is a 'California Air Quality Standard'. The Canadian Federal Government has set National Ambient Air Quality Objectives (NAAQO) for sulphur dioxide at three levels. These are: Desirable Objectives of 450 $\mu g/m^3$ (1-hour averaging time), 150 $\mu g/m^3$ (24-hour averaging time), and 30 $\mu g/m^3$ (annual average); Acceptable Objectives of 900 $\mu g/m^3$ (1-hour averaging time), 300 $\mu g/m^3$ (24-hour averaging time), and 60 $\mu g/m^3$ (annual average); and a Tolerable Objective of 800 $\mu g/m^3$ (24-hour averaging time). The U.S. Federal Government has set National Air Quality Standards[11] of 365 $\mu g/m^3$ (24-hour averaging time) and 80 $\mu g/m^3$ (annual average) for sulphur dioxide. The WHO[10] recommends a health-based ambient air guideline of 500 $\mu g/m^3$ for a 10-minute averaging time. The WHO[10] guideline is based on the lowest-observed-effect level of 1000 $\mu g/m^3$ (divided by an uncertainty factor of 2) which caused a significant increase in the specific airway resistance of exercising asthmatic patients. The WHO[10] also recommends a 1-hour ambient air guideline of 350 $\mu g/m^3$. Sulphur dioxide has been classified in category 'D' because sulphur dioxide guidelines are generally set and/or revised as a result of Federal-Provincial reviews, which set out NAAQOs

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	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(6)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(7)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Sulphuric acid 7664-93-9	C		35 1970	-	-	-	1000 / 100	2.72	Human ACGIH	Inhl	Occ[13]	Irr lung, erosion of tooth enamel	22	15 (25/2.4) NYS-DEC	YES	C	The limiting factor used in the setting of the AAQC is corrosion. It was estimated that sulphuric acid and hydrochloric acid have comparable corrosion potentials. Therefore, the 24-hour AAQC of 35 $\mu g/m^3$ for hydrochloric acid (at the time) was adopted for sulphuric acid. There seems to be a consensus among NYSDEC[12] (AGC is 2.4 $\mu g/m^3$ and SGC is 240 $\mu g/m^3$) and MASS for possible adverse long-term effects induced by this compound (Calabrese[13] also suggested a TWA of 2 ug/m^3). In view of these differences and of the environmental importance of sulphuric acid, a review/up-date is recommended
Suspended particulate matter < 44 um aerodynamic diameter N/A	Vis		120 1988	-												D	The 24-hour AAQC of 120 $\mu g/m^3$ is a criterion for ambient air anywhere, it is based on protection of visibility; it should be the summed contribution of all sources of particulate matter; it is measured with a HI VOL instrument operated over a continuous 24-hour period according to the procedure MOE-AMP-101. The rationale is apparently based on extensive experimental work involving measurements with nephelometers, visibility observations and high volume sampling. The Canadian Federal Government has set National Ambient Air Quality Objectives (NAAQO) for Total Suspended Particulate Matter at three levels. These are: a Desirable Objective of 60 $\mu g/m^3$ (annual average); Acceptable Objectives of 120 $\mu g/m^3$ (24-hour averaging time) and 70 $\mu g/m^3$ (annual average); and a Tolerable Objective of 400 $\mu g/m^3$ (24-hour averaging time). TSP has been classified in category 'D' because TSP guidelines are generally set and/or revised as a result of Federal-Provincial reviews, which set out NAAQOs

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies Guidelines				Description of Study used as basis of Other Agency Guideline (most relevant)				Time Elaps (Yrs)	Comparison of Other Agency and Health-based OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ / $\mu g/m^{3(a)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ / $\mu g/m^{3(a)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Tetrahydrofuran 109-99-9	O	93000 (24hr) 1970		14750 low level of toxicity 1971	-	-	590000 / 59000	80.18	Dog ACGIH	Inhl	12 week	no effect	22	0.25 (14750/ 59000) ACGIH	NO	C	The limiting factor used in the setting of the AAQC is odour although it is noted that the health-based value is slightly lower. Some confusion exists in the corresponding rationale, which contains no relevant and adequate information to judge the setting of these numbers and, consequently, it is suggested that this compound be reviewed/up-dated
Titanium 7440-32-6	P		120 1988	-	-	-	-	-					4			D	The limiting factor used in the setting of the AAQC is the TSP standard because titanium is considered to be an inert dust. ACGIH considers titanium dioxide to be an inert dust and has assigned it a TLV of 10000 $\mu g/m^3$. Calabrese[15] suggested a 24 hour TWA of 150 ug/m^3 based on PM_{10}
Toluene 108-88-3	O	2000 (24hr) 1970		8000 appears to be based on the TLV 1970	200 / 700	200	147000 / 14700 Human, Inhl, Occ[13], head-ache, irritation	10.24	Rat EPA	Oral	13 week	Sys inc liver, kidney weight	22	2.85 (2000/ 700) EPA	YES	C	Toluene in used in the manufacture of therapeutic drugs. The limiting factor used in the setting of the AAQC is odour. It appears that the health-based AAQC was derived from the previous TLV of 750000 $\mu g/m^3$ divided by an uncertainty factor of 100. The WHO[10] recommends a health-based air guideline of 7500 $\mu g/m^3$ for a 24-hour averaging time. The WHO[10] guideline is based on the lowest-observed-effect level of 375000 $\mu g/m^3$ (divided by an uncertainty factor of 50) which causes central nervous system effects and eye and nose irritation in humans (acute experimental and occupational exposures). Although EPA has medium confidence in the RfD and an RfC is pending review and that the AAQC/MR ratio gives an acceptable value of 2.85 for odour and 11 for health effects, it is recommended that this compound be reviewed-up-dated in light of the vast amount of information available and the relevance of this compound from an environmental point of view

Chemical Name CAS #	Description of OMOE 24 hr AAQC[1] and Date of Proposal				Other Agencies Guidelines				Description of Study used as basis of Other Agency Guideline (most relevant)				Time Elaps (Yrs)	Comparison of Other Agency and Health-based OMOE Guideline		OMOE Classification of Contaminant for Review/Up-date or Assessment	
	LE	Odour based values $\mu g/m^3$	Particulate Corrosion, Soiling, Visibility, Vegetation effects, based values $\mu g/m^3$	Health effects based values $\mu g/m^3$ and EP	EPA[2] RfD $\mu g/kg/d$ —— $\mu g/m^{3(6)}$	CA[3] accept exp limit $\mu g/m^3$	ACGIH TLV-TWA[4] $\mu g/m^3$ —— $\mu g/m^{3(7)}$ and EP	MASS AAL[5] $\mu g/m^3$	Test Species and Other Agency	Route of Admin	Exp Dur	EP Irr/ Sys		AAQC/ MR and Other Agency	LE/ EP	Class	Comments
Xylenes 1330-20-7	O	2300 (24hr) 1970		10420 based on TLV 1985	2000 —— 7000	300	434000 —— 43400 Human, Inhl, Acu, Irr, nose, throat, eye	11.80	Rat EPA	Oral	2 year	Sys dec body weight, hyper-activity	22	0.33 (2300/ 7000) EPA	YES	C	Xylenes are used in the making of therapeutic drugs. The limiting factor used in the setting of the AAQC is odour. The health-based AAQC was derived from the TLV divided by an uncertainty factor of 42. Although EPA has medium confidence in the RfD and an RfC is pending review and that the AAQC/MR ratio gives an acceptable value of 0.33 for odour and 1.49 for health effects, it is recommended that this compound be reviewed-up-dated in light of the vast amount of information available and the relevance of this compound from an environmental point of view
Zinc 7440-66-6	P		120 1988	-	-	35 for Zinc compd	-	-					4			D	The limiting factor used in the setting of the AAQC is the TSP standard because zinc (as zinc oxide) is considered to be an inert compound, not generally recognized as an irritant. ACGIH also considers zinc oxide to be an inert compound and has assigned it a TLV of 10000 $\mu g/m^3$ for dust (to prevent nuisance), and 5000 ug/m^3 for fumes (to prevent metal fever). With the current AAQC of 120 ug/m^3, the resulting AAQC/MR ratio is 0.24 when compared to the ACGIH TWA for fumes divided by an uncertainty factor of 10; and 1, when this same ACGIH TWA is divided by an uncertainty factor of 42 (to average from an 8 hours/day, 5 days/week to 168 hours/week). Based on these considerations, the current AAQC is considered adequate to prevent both nuisance and metal fever that could result from exposure to zinc oxide and, consequently, should remain unchanged

GENERAL ABBREVIATIONS USED IN TABLE

AAL - Allowable Ambient Limit
AAQC - Ambient Air Quality Criterion
accept - acceptable
ACGIH - American Conference of Governmental Industrial Hygienists
acu - acute
admin - administration
AGC - Annual Guideline Concentration
ARB - Air Resources Branch
assess - assessment
CA - California
CAS - Chemical Abstract Service
dec - decrease
dur - duration
elaps - elapsed
EP - endpoint
EPA - U.S. Environmental Protection Agency
exp - exposure
H - health effects
hr - hour
inc - increase
inhl - inhalation
irr - irritation
LE - limiting effect
LOAEL - lowest observable adverse effect level
MASS - Massachusetts
MR - most relevant
NIOSH - National Institute for Occupational Safety and Health
NTP - U.S. National Toxicology Program
NYSDEC - New York State Department of Environmental Conservation
O - odour effects
occu - occupational
OEL - Occupational Exposure Limit
OMOE - Ontario Ministry of the Environment
P - particulate
PM_{10} - inhalable particulate
POI - Point of Impingement
resp - respiratory effects
RfC - reference concentration
RfD - reference dose
REL - Recommended Exposure Limit
S - soiling effects
SAR - structure activity relationship
SGC - Short-term Guideline Concentration
sys - systemic effects
TLV - Threshold Limit Value
TSP - Total Suspended Particulate

Abbreviations continued

TWA - Time Weighted Average
WHO - World Health Organization
yrs - years

Footnotes:

1. As per OMOE. 1992. Summary of Point of Impingement Standards, Ambient Air Quality Criteria (AAQCs), and Approvals Screening Levels (ASLs). OMOE, ARB, Toronto, Ontario.
2. As per U.S. EPA. 1992. Integrated Risk Information System (IRIS). U.S. EPA, Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH.
3. As per CAPCOA (California Air Pollution Control Officers Association). 1992. Air Toxics 'Hot Spots' Program Risk Assessment Guidelines.
4. ACGIH. 1986 and 1991. Documentation of the Threshold Limit Values and Biological Exposure Indices. 5th and 6th Edition. ACGIH, Cincinnati, Ohio.
5. As per Massachusetts Department of Environmental Protection. 1990. The Chemical Health Effects Assessment Methodology and The Method to Derive Allowable Ambient Volume II. Massachusetts Department of Environmental Protection, Office of Research and Standards. Boston, Massachusetts.
6. Inhalation RfC was estimated from the Oral RfD by assuming that a 70 kg adult breathes 20 m^3 of air per day and equal absorption occurs by the inhalation and oral exposure pathways.
7. For local acute effects such as irritation, the TLV was divided by an uncertainty factor of 10 to protect sensitive members of the population in order to compare with the health-based AAQC.
8. Class refers to the requirements for review/assessment/standard setting; A: the interim standard may be considered for standard setting; B: substantial reduction and/or reassessment; C: review; D: unchanged status (for details see text)
9. For systemic toxicants, the TLV was divided by an uncertainty factor of 420, where 420 is the uncertainty factor: 4.2 (to extrapolate from a 40 hour work week to a 168 hour full week) times 10 (to extrapolate from healthy workers to sensitives) times 10 (since adverse health effects are often seen at the TLV's), in order to compare with the health-based AAQC.
10. As per WHO. 1987. Air Quality Guidelines for Europe. WHO, Copenhagen, Denmark.
11. As per U.S. EPA. 1992. Health Effects Summary Tables. U.S. EPA, Office of Research and Development, Office of Emergency and Remedial Response, Washington, DC.
12. As per New York State Department of Environmental Conservation (NYSDEC). 1991. New York State Air Guide-1. Guidelines for the Control of Toxic Ambient Air Contaminants. NYSDEC, Division of Air Resources.
13. As per Calabrese, E.J.,and Kenyon, E.M. 1991. Air Toxics and Risk Assessment. Lewis Publishers Inc., Michigan, 662p.
14. According to a memorandum from P. Kupa, dated December 30, 1975, the averaging times for the AAQC of monomethyl amine and acetone should be 1 hour and not 24 hours; and for furfural the averaging time should be 24 hours and not 1 hour.

APPENDIX G

REVISION OF INTERIM STANDARDS. NON HEALTH EFFECTS END-POINTS

TABLE G: REVISION OF INTERIM STANDARDS. NON HEALTH EFFECTS END-POINTS

Chemical Name CAS #	LE	MOE EXISTING ODOR BASE VALUES µg/cu.m.			SOURCE OF MOE ODOUR VALUES.	RUTH REVIEW.			ORTECH ODOUR IMPACT MODELS			AIHA ODOR THRESHOLDS.			Values derived from pathway		Classification
						RANGE µg/cu.m			RANGE µg/cu.m.			Quoted values ppm.	Calculated values. µg/cu.m.	Range of values. µg/cu.m.	µg/cu.m.		
		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level						
Acetophenone 98-86-2	O			850	K.Verschueren HEDOC,1983	834.7	2946	*	*	*	*	*	*				D
Alkyltoluene sulphonamide, n N/A	P																N/A
Aluminium oxide 1344-28-1	P																N/A
Amyl acetate, iso 128-92-8	H/O					*	*	*	*	*	*	0.22	1188	18-1128600	1188(I)		C
Amyl acetate, n. 628-63-7	H/O					26.5	37100	530000	*	*	*	0.052	280	280-39420	280 (I)		C
Amyl acetate, sec. 626-38-0	H/O					10.7	10.7	*	*	*	*	*	*				D
Ammonium chloride 12125-02-9	P																N/A

Chemical Name CAS #	LE	MOE EXISTING ODOR BASE VALUES pg/cu.m.			SOURCE OF MOE ODOUR VALUES.	RUTH REVIEW.			ORTECH ODOUR IMPACT MODELS			AIHA ODOR THRESHOLDS.			Values derived from pathway		Classification
						RANGE pg/cu.m			RANGE pg/cu.m.			Quoted values ppm.	Calculated values. pg/cu.m.	Range of values. pg/cu.m.	pg/cu.m.		
		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level						
Benzoyl chloride 98-88-4	C+H																N/A
Butanol, tert 75-65-0	H	30900	.			219000	219000	*	42000	133563	*	960	2952960	10151- - 2952960	352170		C
Biphenyl 92-52-4	O		60		K. Verschueren HEDOC 1983	6.2	300	7500	3.3 (I)	12.7	*	*	*	*	3.3(I)		C
Butanol, iso- 78-83-1	O			2640	(ACGIH #) 1985 86	360	225000	300000	1700	5300	420	3.6	1169	369-42504	1409		C
Butanol, n- 71-36-3	O			3100	(ACGIH #) 1985-86	360	150000	75000	590	1500	520	1.2	389.6	369-38880	479		C
Butyl acetate, n- 123-86-4	O			1000	(ACGIH #) 1985-86	33133	94666	473330	520	1400	280	0.31	1495	579-53042	881		D
Butyl acrylate 141-32-2	P									[redacted]							N/A
Butyl stearate 123-95-5	P																N/A
Calcium carbide 75-20-7	C																N/A

Chemical Name CAS #	LE	MOE EXISTING ODOR BASE VALUES µg/cu.m.			SOURCE OF MOE ODOUR VALUES.	RUTH REVIEW. RANGE µg/cu.m			ORTECH ODOUR IMPACT MODELS RANGE µg/cu.m.			AIHA ODOR THRESHOLDS.			Values derived from pathway µg/cu.m.	Classification
		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level	Quoted values ppm.	Calculated values. µg/cu.m.	Range of values. µg/cu.m.		
Calcium cyanide (total salt) 592-01-8	P															N/A
Chloroacetone 133-90-4	P															N/A
Diacetone alcohol 123-42-2	O			1350	Hellman,JPCAA 1974, 24, p.979	1344	480000	240000	37000	82000	27000	0.27	1302	1302-5304	6940	C
Diethylene glycol monoethyl ether 111-90-0	O			1100	K.Verschueren, HEDOC 1983.	*	*	*	*	*	*	*	*			D
Diethylamine 109-89-7	H/O		2910			60	114000	150000	*	*	*	0.053	161	61-42490	98	C
Dimethyl ether 115-10-6	O	2100			Not stated	*	*	*	300000	*	220000	*	*		300000(T)	D
Dibutylamine 111-92-2	H		2645			423	2539	*	*	*	*	*	*			C
Dimethylamine 124-40-3	O		1840			*	*	*	37.8	55800	*	*	*		37.8(T)	C
Diisobutyl ketone 108-83-8	H/O			649		660	1860	150000	9300	46000	*	*	*		9300(T)	D

Chemical Name CAS #	LE	MOE EXISTING ODOR BASE VALUES pg/cu.m.			SOURCE OF MOE ODOUR VALUES.	RUTH REVIEW. RANGE pg/cu.m			ORTECH ODOUR IMPACT MODELS RANGE pg/cu.m.			AIHA ODOR THRESHOLDS.			Values derived from pathway pg/cu.m.	Classificatio n
		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level	Quoted values ppm.	Calculated values. pg/cu.m.	Range of values. pg/cu.m.		
Dodecyl benzene sulphonic acid 1886-81-3	P															N/A
Ethanol (ethyl alcohol) 64-17-5	O		19000		Sullivan, R.J APAOC Sept 1969	342	9690000	9500000	36000	410000	*	180	344160	93688-1368992	111309	C
Ethyl ether 60-29-7	H	30000				990	3000	300000	950	9800	*	*	*		950(I)	C
Ethyl hexanol, 2- 104-76-7	O		600		Stahl, W.H COTT 1973	399	734	*	800	1900	*	*	*		800(I)	C
Ethyl-3-ethoxy propionate 763-69-9	O			200	No ref cited	*	*	*	110	380	*	*	*		110(I)	C
Ethylene glycol butyl ether (Butyl cellosolve) 111-76-2	O			500	K. Verschueren HEDOC 1983	480	288000	*	1900	*	*	0.1 (Ref)	491	491-1718	965	C
Ethylene glycol butyl ether acetate (Butyl cellosolve acetate) 112-07-2	O			700	K. Verschueren HEDOC 1983	719	1308	*	6500	*	*	*	*		6500(I)	C
Ethylene glycol ethyl ether (Cellosolve) 110-80-5	O			1100	K. Verschueren HEDOC 1983	2075	185000	*	11600	*	*	2.7	10098	1122-89760	10822	C

Chemical Name CAS #	LE	MOE EXISTING ODOR BASE VALUES pg/cu.m.			SOURCE OF MOE ODOUR VALUES.	RUTH REVIEW. RANGE pg/cu.m			ORTECH ODOUR IMPACT MODELS RANGE pg/cu.m.			AIHA ODOR THRESHOLDS.			Values derived from pathway pg/cu.m.		Classification
		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level	Quoted values ppm.	Calculated values. pg/cu.m.	Range of values. pg/cu.m.			
Ethylene glycol ethyl ether acetate (Cell. ace) 111-15-9	O			300	K. Verschueren HEDOC 1983	302	270000	*	480	*	*	0.06	329	329-713	397		C
Ethylenediaminetetraacetic acid 60-00-4	P																N/A
Ethylene Glycol Monobenzyl ether 112-25-4	H	2500				*	*	*	2500	21000	*	*	*	*	2500(I)		C
Isobutyl acetate 110-19-0	O			1660	K. Verschueren HEDOC, 1983	9	90000	1350000	*	*	*	1.1	5304	1735-17359			C
Isopropyl acetate 108-21-4	O			2000		190	1520000	380000	9400	36500	*	4.1	17384	2120-144160	12783		C
Isopropyl benzene 98-82-8	O		100		K. Verschueren HEDOC, 1983	39	6370	*	600	3500	*	0.032	159.6	40-658	309		C
Malathion 121-75-5	P																N/A
Mercaptobenzothiazole disulfide 120-78-5	P																N/A
Metaldehyde (acetaldehyde tetramer) 108-62-3	P																N/A

Chemical Name CAS #	LR	MOE EXISTING ODOR BASE VALUES µg/cu.m.			SOURCE OF MOE ODOUR VALUES.	RUTH REVIEW. RANGE µg/cu.m			ORTECH ODOUR IMPACT MODELS RANGE µg/cu.m.			AIHA ODOR THRESHOLDS.			Values derived from pathway	Classificatio n
		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level	Quoted values ppm.	Calculated values µg/cu.m.	Range of values µg/cu.m.	µg/cu.m.	
Methacrylic acid 79-41-4	O	2000				*	*	*	1900	4900	*	*	*	*	1900(I)	C
Methoxychlor 72-43-5	P															N/A
Methyl isobutyl ketone 108-10-1	O	1200			ARB TDAS	41	192700	410000	6300	31000	*	0.88	3658	415-32424	4800	C
5-Methyl-2-hexanone 110-12-3	O			630		*	*	*	630	*	*	*	*	*	630(I)	A
Methyl mercapto aniline 2987-53-3	UD	*	*	*		*	*	*	1700	*	*	*	*	*	1700	C
Naphthalene 91-20-3	H/O			50		1500	125000	75000	450	*	*	0.038	2822	50-3404	1127	C
Molybdenum 7439-98-7	P															N/A
Octane 111-65-9	O			61800	Not cited	725000	1208330	1450000	90000	270000	97000	150	710850	71085-1113665	252935	C
Polybutene-1-sulphone N/A	P															N/A

Chemical Name CAS #	LE	MOE EXISTING ODOR BASE VALUES pg/cu.m.			SOURCE OF MOE ODOUR VALUES.	RUTH REVIEW. RANGE pg/cu.m			ORTECH ODOUR IMPACT MODELS RANGE pg/cu.m.			AIHA ODOR THRESHOLDS.			Values derived from pathway		Classificatio n
												Quoted values ppm.	Calculated values. pg/cu.m.	Range of values. pg/cu.m.	pg/cu.m.		
		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level						
Polychloroprene 25267-15-6	P																N/A
Potassium cyanide 151-50-8	P																N/A
Potassium hydroxide 1310-58-3	C																N/A
Potassium nitrate 7757-79-1	P																N/A
Propanol, iso (isopropyl alcohol) 67-63-0	O	24000			TLV values, ACGIH 3rd Ed, 1971 (*)	7840	490000	490000	180000	430000	*	43	107242	92278-1521340	138937		C
Propionaldehyde 123-38-6	O			10		22	403	*	210	5400	*	*	*	*	210(I)		C
Propionic acid 79-09-4	O		100		K. Verschueren HEDOC 1983.	84	60000	*	1200	4600	*	0.066	203	80-523	493		C
Propionic anhydride (as propionic acid) 123-62-6	O		100		K. Verschueren HEDOC 1983.	*	*	*	3400	12700	*	*	*	*	3400(I)		C

Chemical Name CAS #	LE	MOE EXISTING ODOR BASE VALUES pg/cu.m.			SOURCE OF MOE ODOUR VALUES.	RUTH REVIEW.			ORTECH ODOUR IMPACT MODELS			AIHA ODOR THRESHOLDS.			Values derived from pathway		Classification
						RANGE pg/cu.m			RANGE pg/cu.m.			Quoted values ppm.	Calculated values. pg/cu.m.	Range of values. pg/cu.m.	pg/cu.m.		
		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level						
Propylene glycol methyl ether 107-98-2	O			121000	ITT Research Inst. Sept 12, 1965.	360000	360000	3600000	31000	71000	16000	10 (Ref)	37410	37410	31000		C
Propylene glycol monomethyl ether acetate 108-65-6	O	5000			ITT Research Inst Sept 12, 1965	*	*	*	700	2500	*	*	*		700(I)		C
Pyridine 10-86-1	H/O			80		9.0	15000	90000	1500	*	*	0.66	2165	754-6232	1802		C
Sodium bisulphite 7631-90-5	P																N/A
Sodium cyanide 143-33-9	P																N/A
Sodium hydroxide 1310-73-2	C																N/A
Strontium 7440-24-6	P																N/A
Strontium carbonate 1633-05-2	P																N/A
Strontium hydroxide 18480-07-4	P																N/A

Chemical Name CAS #	LE	MOE EXISTING ODOR BASE VALUES pg/cu.m.			SOURCE OF MOE ODOUR VALUES.	RUTH REVIEW. RANGE pg/cu.m			ORTECH ODOUR IMPACT MODELS RANGE pg/cu.m.			AIHA ODOR THRESHOLDS.			Values derived from pathway pg/cu.m.		Classificatio n
		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level	Quoted values ppm.	Calculated values. pg/cu.m.	Range of values. pg/cu.m.			
Strontium oxide 1314-11-0	P																N/A
Sulphamic acid 5329-14-6	P																N/A
Total reduced sulphur N/A	O		40		Not listed	*	*	*	*	*	*	*	*				C
Triethyl amine 75-50-3 »	O		0.5		W.H. Stahl COTT, 1973.	0.8	0.8	*	5.9	16.5	*	0.00011 (Ref)	0.3	0.3-2134	1.3		C
Trimethylbenzene, 1,2,4- 95-63-6	O	1000			K. Verschueren HEDOC, 1983.	*	*	*	*	*	*	0.006 (Ref)	30	29.9-11971	30		C
Whey powder N/A	P																N/A

Abbreviations:

* = Not cited.
# = Values derived from health effect studies
LR: Limiting effects; Oxidant; Particulates; C: corrosion
+ = Data cannot be read from graph.
I = Interim proposal

JPCAA. Journal of Air Pollution Control Association.
ACGIH..American Conference of Governmental Industrial Hygienists
APAOC..Air Pollution Aspects of Odorous Compounds, Litton Industries Inc.
COTT ..Compilation of Odor and Taste Threshold Data, ASTM, 1973, DS 48
TDAS..Technology Development and Appraisal Section
HEDOC..Handbook of Environmental Data on Organic Chemicals.
Ref..Values taken from reference range.

Classification column:

A: Denotes that the interim standard be adopted as a standard.
C: " " an update is required before conversion to a standard or development of an odour based standard is required if one is not available.
D: " that the status should remain unchanged.
N/A " Not applicable for odour based standards.

The Geometric Mean (GM) is considered as the best means of statistically averaging a range of values that occur over several orders of magnitude.

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APPENDIX H

REVISION OF STANDARDS. NON HEALTH EFFECTS END-POINTS

TABLE H: REVISION OF STANDARDS. NON HEALTH EFFECTS END-POINTS

Chemical Name CAS #	LE	MOE EXISTING ODOR BASE VALUES µg/cu.m.			SOURCE OF MOE ODOUR VALUES.	RUTH REVIEW.			ORTECH ODOUR IMPACT MODELS			AIHA ODOR THRESHOLDS.			Values derived from pathway.	CI	
						RANGE µg/cu.m			RANGE µg/cu.m.			Quoted values ppm.	Calculated values µg/cu.m.	Range of values µg/cu.m.	µg/cu.m.		
		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level						
Acetic acid 64-19-7	O	2500			Sullivan, R.J APAOC, 1969	2500	250000	25000	370	5300	*	0.074	184.6	92-574	261	C	
Acetone 67-64-1	O	48000				47466	1613860	474670	40000	800	*	62	149482	8787-1593973	77325	D	
Acetylene 74-86-2	O	56000			Verschueren, K. HEDOC 1983	657200	657200	*	510000	1070000	*	*	*		510000	D	
Ammonia 7664-41-7	O	3600				26.6	39600	72000	3700	13600	*	17	12019	30-37471 (Ref)	6668	D	
Boron trifluoride 7637-07-2	V	2				45000	45000	*	*	*	*	*	*	*	*	N/A	
Bromine 7726-95-6	H	20				329	24500	2100	*	*	*	*	*	*	*	N/A	
Carbon disulphide 75-15-0	O	330				24.3	23100	*	3900	2700	*	*	*	*	3900	D	
Chlorine 7782-50-5	H/V	150				30	15000	9000	*	*	*	0.08	116.4	30-44974	59	C	

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						RANGE µg/cu.m			RANGE µg/cu.m.			Quoted values ppm.	Calculated values. µg/cu.m.	Range of values µg/cu.m.	ug/cu.m.		
		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level						
Chlorine dioxide 10049-04-4	H	30			MOL Health Studies Services.	300	300	1500	*	*	*	*	*		*	N/A	
Dimethyl sulphide 75-18-3	O		30		Sullivan, R.J APAOC 1969	2.5	50.8	*	51	99	*	*	*	*	51	D	
Dimethyl disulphide 624-92-0	O		40		Sullivan, R.J APAOC 1969	0.1	546	*	66	180	*	*	*		66	D	
Ethyl acetate 141-78-6	O		19000		Sullivan, R.J APAOC 1969	19.6	665000	350000	28000	1300000	*	18	65844	23411-182900	42937	C	
Ethyl acrylate 140-88-5	O		4.5		Sullivan, R.J APAOC 1969	0.8	32000	16000	13	29	*	$2.4*10^{-6}$	1.0	0.83-5.4	3.6	C	
Ethyl benzene 100-41-4	O		4000		Consultant to MOE	8700	870000	870000	1900	16000	*	*	*	*	1900	C	
Formaldehyde 50-00-0	O		65		Harding, D.H OHO 1982	1470	73500	1500	2200	*	*	*	*	*	2200	C	
Formic acid 64-18-6	H	500			Consultant to MOE 1973	45	37900	27000	*	*	*	*	*	*		N/A	
Furfural 98-01-1	O		1000		Consultant to MOE 1973	34	20000	48000	2800	*	*	*	*	*	2800	D	

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		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level						
Furfuryl alcohol 98-00-0	H	1000			Consultant to MOE 1973.	32000	32000	*	*	*	*	*	8 (Ref)	32592 (Ref)		N/A	
Hydrogen chloride 7647-01-0	C	40			Consultant to MOE 1988	*	*	*	*	*	*	*	*	*	*	N/A	
Hydrogen cyanide 74-90-8	H	575			Consultant to MOE	900	5000	*	*	*	*	*	*	*	*	N/A	
Hydrogen sulphide 7783-06-4	O		30		Loginova, R.A Abst Sov. Med 3, 1pt B. 1959.	0.7	14	14000	5.5	22.5	*	0.0094	13.3	1.4-183	8.5	C	
Methyl acrylate 96-33-3	O		4			70000	70000	262500	61	170	*	*	*	*	61	D	
Methyl ethyl ketone 78-93-3	O		31000		Sullivan, R.J. APAOC	737	147500	590000	4800	65300	*	16	47888	6000-254405	15161	C	
Methyl methacrylate 80-62-6	O	860			Sullivan, R.J. APAOC	205	1394	697000	2700	9600	*	0.049	205.7	58-1907 (Ref)	741	D	
Methyl mercaptan 74-93-1	O		20		R.J. Sullivan APAOC, 1969	0.04	0.08	*	2.4	11.2	*	0.00054	1.07	0.000039-41.8	1.6	C	

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						RANGE µg/cu.m			RANGE µg/cu.m.			Quoted values ppm.	Calculated values. µg/cu.m.	Range of values µg/cu.m.	µg/cu.m.		
		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level						
Monomethyl amine 74-89-5	O	25			Sullivan, R.J. APAOC	25	12000	24000	230	510	*	4.7	6058	1.16-6031 (Ref)	1180	C	
Nickle carbonyl 13463-39-3		0.5			Consultant to MOH	210	21000	*	*	*	*	*	*			N/A	
Nitric acid 7697-37-2	C	35				750	2500	155000	*	*	*	*	*			N/A	
Ozone 10028-15-6	H/V		165		MOE	10	1020	2000	*	*	*	*	*			N/A	
Pentaborane 19624-22-7	H	1				2500	2500	*	*	*	*	*	*			N/A	
Phenol 108-95-2	H	100				178	22420	182400	500	2200	*	0.06	234	17.5-3900 (Ref)	342	C	
Phosgene 75-44-5	H	45			Consultant to MOL	2000	4000	8000	*	*	*	*	*			N/A	
Propylene dichloride 78-87-5	O	2400			JPCAA 1974.	1166	606666	*	40000	94000	*	0.36	1210	1210-3429 (Ref)	6957	C	
Styrene 100-42-5	O	400				430	860000	4300000	1300	3800	*	0.14	605	73.5-8313	886	C	

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		24 HRS.	1 HR.	10 MIN.		Low	High	Irritating Conc.	50% Detection level	50% Complaint level	Annoyance level						
Sulphur dioxide 7446-09-5	H/V	275	690		Sullivan, R.J APAOC 1969	1175	12500	5000	*	*	*	2.7	7182	878-13300	2904	N/A	
Tetrahydrofuran 109-99-9	O	93000			Sullivan, R.J APAOC 1969	7375	177000		18000	88000	*	31	92783	275-182574 (Ref)	40866	C	
Toluene 108-88-3	O	2000				8025	150000	750000	12000	68000	*	16	6118	611-141488	8568	C	
Toluene diisocyanate 584-84-9	H	0.5			Consultant to the Health Studies Services of MOL.	3200	17120	4000	*	*	*	*	*	*	*	N/A	
Trichloroethane 71-55-6	H	115000							*	*	*	390	2156310	88464-3947706 (Ref)		N/A	
Trichloroethylene 79-01-6	H	28000				1134	2160000	864000	*	*	*	82	446572	2727-909482 (Ref)		N/A	
Trichloro trifluoro ethane 76-13-1	H	800000				342000	1026000	*	9400	36500	*	*	*	*	9400	C	
Xylene 1330-20-7	O	2300			Sullivan, R.J APAOC 1969	348	174000		3600	14000	*	20	88120	356-176240 (Ref)	17811	C	

Abbreviations:

* = Not cited.
θ = Values derived from health effect studies
Lft: Limiting effects; O:odour; P:particulate; C: corrosion
+ = Data cannot be read from graph.
I = Interim proposal

JPCAA..Journal of Air Pollution Control Association.
ACGIH..American Conference of Governmental Industrial Hygienists
APAOC..Air Pollution Aspects of Odorous Compounds, Litton Industries Inc.
COTT ..Compilation of Odor and Taste Threshold Data, ASTM, 1975, DS 48
TDAS..Technology Development and Appraisal Section
HEDOC..Handbook of Environmental Data on Organic Chemicals.
Ref..Values taken from reference range.

Classification column:

C: Denotes that an update is required.
D: " that the status should remain unchanged.
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